DOCTOR OF PHILOSOPHY

An exploration of Simulation Based Medical Education (SBME) innovation through the COVID-19 pandemic
A comparative case study of two medical schools (Scotland and Thailand)

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An exploration of Simulation Based Medical Education (SBME) innovation through the COVID-19 pandemic:

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Abstract

Simulation-based medical education (SBME) is an essential component of undergraduate medical programmes, providing a secure environment for teaching and evaluating practical knowledge and clinical skills. Research on SBME has predominantly come from North America and Europe where researchers focus more on the effectiveness of and the experiences of learners and tutors. However, there is limited knowledge regarding how SBME is integrated into curricula, as well as how it is normalised and innovates, particularly in the Southeast Asian context. The outbreak of the COVID-19 pandemic from 2019-2022 disrupted healthcare education worldwide and gave rise to new perspectives and approaches to SBME. As a result, it provided a valuable opportunity to gain insights into the understanding and potential evolution of SBME.

This research explores the transformative innovation of SBME using a comparative case study design. A qualitative, interpretive approach is used to compare a case study of an established SBME user in Western Europe, specifically in Scotland to a case study of a SBME user in Southeast Asia, specifically in Thailand where the technology is relatively new. Data were generated by conducting interviews with the staff involved in SBME design and implementation, along with the analysis of educational policy, guidance, and teaching documentation. The data collection period included both pre-pandemic and pandemic times, aiming to gain insights into how the unprecedented disruption has affected the understanding and practices associated with SBME in both Scottish and Thai contexts.

Results find that in Scotland, there is a significant correlation between healthcare and medical education needs and SBME integration in the medical curriculum. The availability of a clinical skills centre and related infrastructure further supports a systemic, embedded approach to SBME, which facilitates innovation agility. In contrast, the Thai site primarily emphasises SBME for assessment purposes, rather than incorporating it into the broader curriculum. Support for infrastructure and divergent perspectives on educational theory were found to be linked with a less cohesive SBME approach and a reduced number of innovations.

The significance of these findings lies in their ability to highlight the importance of healthcare service-medical education interactions and contextual trajectories for medical schools, particularly in terms of the implementation and innovation of SBME. Furthermore, there are important implications to consider regarding the transfer of SBME theory, principles, and findings between different contexts and cultures in the field of medical education. This study uncovers novel and significant insights that reveal critical disparities that may exist among curricula, institutions, and broader medical education environments. These disparities are likely to affect the advancement, creativity, and significance of SBME in undergraduate medicine.

Key words: Simulated based medical education, medical Education, blended learning, COVID-19, innovation, normalisation

Dedication

This thesis is dedicated to my wonderful family. I would not be the person I am today without them. They have given me the confidence, encouragement, hope and support over many years, especially in the time of pandemic and the loss of my health, to allow me to push my boundaries and achieve my goals. This achievement is for you.

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List of abbreviations and acronyms

COTMES	Consortium of Thai Medical Schools
CSC	Clinical Skills Centre
GMC	General Medical Council
MSC	Medical School Council
NPT	Normalisation Process Theory
PCM	Phramongkutklao College of Medicine
SBME	Simulation Based Medical Education
SDMEG	Scottish Deans' Medical Education Groups
SPICES	Student-centred, Problem-based, Integration, Community-based, Elective and Systematic continuum
TMC	The Medical Council of Thailand
TPC	Task-Process-Context dimension
UG	Undergraduate Medicine
UoD	University of Dundee Medical School

Chapter 1: Introduction

1.1 Why Study SBME Transformative Innovation?

Simulation Based Medical Education (SBME) is one of the essential components of undergraduate (UG) medicine. With appropriate design and alignment with other dimensions of the curriculum. It can support students' experiential learning and development. When SBME is thoughtfully and methodically incorporated into the curriculum, it becomes a significant and beneficial aspect.

For approximately 30 years, SBME has been globally presented as an integral part of UG and postgraduate (PG) medicine courses and is widely regarded as an important part of teaching and assessment. It is presented as a way of learning clinical skills in a safe learning environment, can mimic the real-world clinical settings, enabling safe practice and learning prior to engaging with patients in a hospital or community setting. SBME is viewed to be critically important in future curricula because it provides opportunities for learners to master learning outcomes in a safe environment, without compromising patient safety (Issenberg et al., 2003). Moreover, understanding how SBME operates in various contexts is valuable in providing insight for future advancements and determining the necessary elements to facilitate normalisation such as factors needed for 'successful implementation and integration of interventions into routine work' (Murray et al., 2010, P. 1), and transformative innovation such as factors needed to 'enable a transition from one dominant mode of operation in large, complex (public) system to another, over time, while ensuring that operations do not fail in the process' (Leicester, 2016, P. 86).

This study aims to contribute to enhance our comprehension of the functioning of SBME and to explore ways to strengthen and innovate it for the future. Investigating the concepts and practice of transformative innovation within the context of UG medicine systems is overly broad and requires a more specific and focused approach. The foundation of this study lies in SBME in UG medicine, which is presented in the following section. This is followed by an outlined SBME concept, incorporating the transformative innovation discourse. This chapter

includes the presentation of the research aims and objectives and an outline of the thesis structure.

1.2 Introducing Undergraduate Medicine and SBME

Understanding and improving clinical skills development through SBME has served as a safeguard for the developed healthcare system. SBME is an already prominent feature in Western European and Northern American countries, and has been considered important for the improvement of medical students and doctors' skills (learning outcomes) and as a way to investigate experiential learning (OECD, 2016). Indeed, medical simulation research acknowledges the diverse assets and resources available at different institutions, which can be utilised to facilitate learners in gaining practical experience and achieving significant learning outcomes (Issenberg et al., 2003). These resources refer to both tangible forms, such as physical, financial, and healthcare capital, but also intangible forms, such as human and medical education capital. This also involves the medical knowledge, skills and networks that enable SBME to be effectively innovated and implemented during the COVID-19 pandemic, which was the same period when this research study was conducted.

A widely recognized practice in SBME involves a sequential four-stage approach for conducting in-person teaching sessions. This process includes a tutor-led demonstration, a briefing and explanation session, supervised learner practice, and finally, corrective and constructive feedback (Bradley & Postlethwaite, 2003). Despite being well-established and used for three decades, medical education literature has not thoroughly explored the complexities of mixed methods learning. Only a handful of studies have drawn on the blended education literature to shed light on this subject (Vallée et al., 2020). Although the adoption of blended learning in medical education is gaining momentum (Morton et al., 2016), scholars in this field have yet to fully investigate its notion in a comprehensive and holistic way. Blended learning often only refers to a hybrid approach that combines both traditional face-to-face instruction with online learning (Morton et al., 2016).

With the disruptive impact of the COVID-19 pandemic, many educational institutions, staff and students had to quickly transition to online and blended learning to continue education while adhering to mandatory social distancing requirements. As a result, questions have emerged about how SBME can be used in innovative ways during the pandemic and beyond. Blended models have been recognised as an important basis for innovative education globally, offering great potential for effective learning (OECD, 2016).

The SBME approach resonates with established student-centred collaborative learning approaches (Ellis, 2001). Simply viewing blended learning as a mix of online and in-person instruction overlooks the intricate details involved in implementing SBME and blended learning, the resulting effects, and how medical tutors guide their undergraduate learners through the curriculum in different settings. The pandemic, which restricted face-to-face interactions, presented an opportunity to delve deeper into the creation of blended SBME. This was an opportunity to explore how medical education tutors were influenced by structures, management mechanisms and the institutional (university and healthcare) context (Arandjelovic et al., 2020). An essential aspect is linking various structures through transformative innovation, which aligns with the NPT concept. This involves integrating implementation activities with the larger-scale changes occurring in the environment to ensure optimal functionality of innovative SBME.

1.3 Face-to-face and Alternative SBME

Many educational programmes are still taught in a 'conventional' in-person (or face-to-face) mode (Lai et al., 2016; Redmond, 2011). The critiques of early curriculum models, which emphasized classroom-based study in the early years of UG medicine and workplace-based study in later phases, identified challenges for learners, including difficulties in connecting their learning to clinical scenarios due to limited clinical exposure. According to Brauer and Ferguson (2015), innovations in more integrated curricula have introduced early clinical exposure and patient-based or case-based learning to bridge the gap between basic science and clinical problems. Such curricula should enhance long term retention of knowledge and understanding. Changes in the curricula had profound effects on medical education across the globe, most

notably for UG medicine. In light of these circumstances, funding has been allocated towards teaching and assessment via SBME (Kneebone, 2005; Nehring & Lashley, 2009). The trend is that face-to-face SBME continues to be highly valued as an effective way to promote the transfer of both technical and non-technical skills to clinical practice (Weller et al., 2012). However, the pandemic has disrupted the operation of in-person SBME, necessitating a need to anticipate and address future challenges with appropriate solutions. During the COVID-19 pandemic, concerns regarding the implementation and innovation of simulation-based medical education (SBME) were observed worldwide (Ferrel & Ryan, 2020; Saavedra, 2020). These concerns have prompted increased attention and awareness about the future of face-to-face and alternative SBME, as well as questions about their implementation and transformative potential. As a result, there has been a particular focus on identifying the barriers and enablers to the adoption of SBME and the implications for academic practice and policy (Albarrak, 2011; Cronje, 2021; Thai et al., 2019)

Apart from the conventional face-to-face teaching, there are other models of teaching available, including distanced learning models (Covington et al., 2005; Miller & King, 2003) and blended learning models (Albarrak, 2011; Cronje, 2021). Examples of the approaches for these models include e-learning, flipped classroom approaches[1], and online learning (Thai et al., 2019). The availability of technological support and the embeddedness of tutor communities of practice plays an important role in the selection of these models which have been recognized as potential catalysts for distance medical education development and generating activities for socially distanced learners and tutors (Sims, 2018). The growth of these approaches to medical education in Western Europe and North America is evidenced by the growth of distance education provision, particularly in asynchronous mode (Miller & King, 2003). However, during times when in-person contact is limited, such as during the pandemic, conventional face-to-face education approaches cannot connect tutors and learners meaningfully. Therefore, the

[1] A type of blended learning where students are encountering to content before class and practice working through freeing class time for activities that involve higher order thinking.

question arises about the innovations that may emerge in response to this situation (Arandjelovic et al., 2020).

1.4 The Pandemic and Social Distancing

The COVID-19 pandemic created circumstances that necessitated the reduction or avoidance of in-person (student-student and student-tutor) contact, which led to valuable insights about the effectiveness of 'distance' and 'blended' SBME approaches. This presented a unique opportunity for research since there is currently limited evidence and understanding about blended SBME, with most of the published literature originating from Western Europe and North America (Cook et al., 2011; Morton et al., 2016; Vallée et al., 2020). Moreover, the pandemic provided a borderless environment that allowed for a focus on the SBME approach itself rather than the geographical boundaries that define it. Therefore, the period of social distancing resulting from COVID-19 disruption is an ideal time for inquiry into blended SBME.

The social distancing can refer to both geographical distancing and social distancing, which refers to the socially embedded relationships that exist between medical tutors, learners, and their patients, which are further removed in distance (Arandjelovic et al., 2020). The conceptual foundations adopted in this research stem from the works of Leicester (2016) and May et al. (2009). Leicester (2016) argues that there are three stages of transformative innovation in introducing a new intervention in a changing landscape. The first stage involves the dominant system losing its effectiveness, such as in the case of traditional in-person SBME. The second stage sees the emergence of innovative alternatives, like blended learning SBME, that aim to capitalize on disruptive trends. Finally, the third stage is characterized by the emergence of new innovative patterns that eventually become the dominant trend.

However, as previously mentioned, there is a need to understand how these ideas and concepts are applied beyond the terrain of Europe and North America and begin to explore the utility of these types of SBME to address the common shortcomings of conventional SBME on a global scale. These shortcomings include logistical obstacles like conflicting schedules among learners, limited availability of facilities and facilitators in light of increasing learner numbers,

high costs, and the need to shift towards tele-simulation as a substitute for in-person team training.

There has been a gradual progression in implementation of SBME over the decades ranging from an endorsement as a teaching method to the acceptance of assessment-based SBME as a required part of a medical license examination (Byrne, 2013). Byrne (2013) demonstrated that the evidence base for SBME is disproportionately located in the Global North and developed countries. More evidence about the processes underpinning SBME and blended SBME such as theoretical embeddedness is needed from Asian and developing countries. This is because Asian and developing countries may have different approaches to SBME as a result of social, healthcare and politico-economic histories and trajectories when compared to much of the Global North (Chung et al., 2013). As such, the context is likely to play a significant role in the use of SBME in medical curricula. This is evident in Table 1.1, which illustrates various debriefing approaches (Chung et al., 2013). Through a comparative analysis of SBME implementation and evolution in Thailand and Scotland which represent two countries in different parts of the world, the researcher can derive novel insights into the impact of contextual factors on SBME for teaching, assessing, and curriculum integration. By examining how implementers perceive, sustain, and modify SBME over time, the study can yield valuable new knowledge regarding the significance of context and its influence on SBME.

Table 1.1: A Comparison of the Debriefing Characteristics in SBME in Different Parts of the World (Chung et al., 2013)

	Far East Asia	Northern Europe	North America	South America
Talking time-instructor	High	Low	Medium	High
Talking time-student	Low	High	High	High
Interaction patterns	Instructor involved in most interactions	Many cross connections between students	Many cross connections between students	Instructor involved in most interactions
Interaction styles	Mostly utterances	Mostly questions and answers/ discussion	Mostly questions and answers/ discussion	Mostly utterances
Initiative for interactions	Instructor	Instructor and students	Instructor and students	Instructor and students

The evidence about social distancing and SBME responses around the globe is currently insufficient to answer these questions, and so this study directly addresses this need. There are tools used to comprehend and compare the implementation. The approaches suggested here are not new. O'Donnell et al. (2017) explored the use of Normalisation Process Theory (NPT) in explaining health services' implementation processes in Austria, England, Greece, Ireland, the Netherlands and Scotland. This was to advance understanding of the complexities of implementation and normalisation constructs including their subconstructs used in the organised education. Leicester (2016) used transformative innovation practice to explore how the implementers foresee possible future scenarios and the challenges to society and examine possible ways to adapt. A greater understanding about how SBME functioned during the pandemic disruption, a potential time of innovation, in the face of adversity, can give rise to deeper understanding of how both new developments and normalisation arises.

1.5 Exploring the Undergraduate SBME – COVID-19 Interface

There is a dearth of recent research that has comprehensively integrated the concepts and literature surrounding SBME and blended learning. However, using NPT and Transformative

Innovation (TI) lenses enables a comprehensive understanding of the implementation process (May et al., 2009) and the systemic view of the context, combining holism with focus (Leicester, 2016).

The aims and objectives of this research are as follow.

1.6 Aims and Objectives

This research is driven by a single aim and three incrementally structured objectives to ensure that the thesis continuously engages with the core concepts and key issues. They are as follows:

Aim:

- To explore transformative innovation of SBME in a systematic SBME user, a Scottish medical school, and a departmental SBME user, a Thai medical school, in association with the COVID-19 pandemic to inform future change in medical education.

Objectives:

- To explore SBME practices in a Scottish medical school (Western Europe) and a Thai medical school (Southeast Asia) and how SBME elites/experts implement and innovate their SBME practice in times of the pandemic.
- To compare the role of contexts and how innovative SBME contributes to the UG curriculum in the two medical schools studied, as well as to consider the wider implications of the findings from a cross-cultural, comparative case study approach.
- To examine the relationships of different micro and macro contexts of medical education and the innovative SBME as well as to develop a framework to inform practical enquiry.

1.7 Discussing the Aims and Objectives and Outlining the Structure of the Thesis

Each of the three objectives contributes to achieving the overall aim. The first objective is underpinned by conducting a review of the current literature and evidence related to the core concepts of conventional and alternative SBME in UG medicine. In addition, this research presents a detailed review of the relatively small amount of evidence base on blended SBME,

which is covered in detail in Chapter 2. Moreover, the first objective allows space to explore the relationships between key themes and theories, enabling an in-depth analysis of the linkages between SBME and the discourse of blended learning. This is also discussed in Chapter 2 whose main objective is to critically explore the existing conceptual research on NPT and TI as well as how they are applied in the context of SBME. This chapter concludes with a conceptual framework that serves to guide the data collection and analytical process. This is a contribution, both timely and innovative, to medical education debates as it offers a literature-informed framework for future research of a similar nature. The second objective enables the application of the theories explored by the first objective. The study focuses on two geographical regions – Scotland in Western Europe, and Thailand in Southeast Asia - which were selected as case studies for conducting comparative research. The reasons for this are justified in Chapter 3, which provides a detailed methodological overview about how the research was designed and implemented, as well as the techniques used to analyze and make sense of the qualitative data generated. In this chapter, the rationale for adopting an inductive philosophical approach and a case study approach, as well as the reasons for using a range of qualitative methods, are also discussed in detail. These methods are semi-structured elite/expert interviewing and documentary analysis.

As part of addressing this second objective, Chapters 4 and 5 serve as the two results chapters, presenting the empirical data and evidence that emerged from the Scottish medical school (Chapter 4) and the Thai medical school (Chapter 5). The research findings and discussion presented in Chapters 4 and 5 demonstrate that medical education capital plays an integral role in facilitating access to other resources and stakeholders. However, there are other aspects associated with processes of both horizontal and vertical embeddedness that are presented and critically discussed in Chapter 6, a comparative chapter drawing together the key results from each case study.

For the third and final objective, the role of place and context is critically discussed along with the broader implications of the key findings. Chapter 6 is largely conceptual and discussion-based, developing the key results to emerge from Chapters 4 and 5. Moreover, Chapter 6 links

back to Chapter 2 to (re)consider the review-based conceptual framework and (re)apply the core concepts to the empirically informed analyses. As part of the third objective, Chapter 6 presents two re-drawn conceptual frameworks (Figure 6.1 and 6.2) that highlight the similarities and differences between the Scottish and Thai contexts in terms of how SBME elites/experts engage with and benefit from medical schools for their outcome-based undergraduate education. The final chapter, Chapter 7, presents the conclusion which addresses the third objective and ensures that the aim of the research is met by drawing together the key findings and discussing them in greater depth. Additionally, this chapter considers the implications of comparative research of this nature. This chapter also evaluates the research process and limitations. Four key findings are presented, along with five future research agendas that each point towards important conceptual trajectories and develop different recommendations, questions and aspects that have emerged from this thesis.

1.8 Summary

This chapter has introduced the background to the research and where it is situated within broader discussions about SBME transformative innovation, as well as about securing SBME purposes. A few key points that require further investigation emerged. In particular, understanding how SBME embeddedness facilitates medical education in contrasting spaces and contexts of UG medicine has yet to be addressed. This enables the role of place to be more fully understood in terms of enabling or disabling SBME as a viable outcome-based strategy for SBME tutors (and students). Furthermore, by simultaneously investigating case studies from both the European West and Asian Southeast, as presented here, it is possible to make comparisons between them within the same methodological and chronological framework. This is not always possible when investigating a single case study exclusively or when operating within the boundaries of a particular geographical context. Comparisons with previous research from within the literature, which may be outdated, often contain different subtle agendas and/or a different focus.

Finally, understanding the transferability of largely Global North (Western Europe) concepts such as SBME to the different healthcare, political, social and cultural contexts of the Global

South (Southeast Asia) is necessary. This not only adds data to a currently small evidence base within the literature, but also provides an insight into the ways different elements, and the connections between them, influence outcome-based strategies and undergraduate SBME. These insights form an important addition in the journey to secure viable and sustainable SBME globally. The narrative now turns to Chapter 2, reviewing and contextualising some of the key issues and theories surrounding SBME, NPT, TI and understanding contemporary debates and perspectives.

Chapter 2: Literature Review

2.1 Introduction

This chapter reviews SBME literature in the context of undergraduate (UG) medical education including pre- and in the time of COVID-19 and lays the conceptual foundation that the subsequent study and analysis is based upon.

This chapter contextualises the position of SBME in UG medicine, including the terminology and how SBME relates to curricula, particularly learning outcomes. This is followed by insights into how the pandemic and the need for social distancing was mitigated, leading to a narrative literature review of SBME during of the pandemic (2020 - 2022). Such review is largely focused on how SBME evolved, including the increase in blended SBME. There is also an examination of how SBME functions differently in different countries/regions.

The first part of this chapter introduces the responses to 'conventional' integrated and outcome-based UG curriculum by discussing SBME in UG curricula, the importance of SBME and its embeddedness within UG medicine in Western Europe. The impacts of micro and macro environment on medical education systems and medical schools are also discussed in this section to illustrate why SBME is considered to be a viable, effective way to support learning in UG medicine. The chapter concludes by reinforcing the importance of change and implementation theories in understanding and effectively implementing SBME. The research methodological framework discussed in chapter 3 is also outlined as part of the closing summary.

2.2 Medical Education and SBME during the COVID-19 Pandemic

During the COVID-19 pandemic, quarantine was one of the effective measures used to curtail the spread of the virus, which relied on organisations (schools, universities) and individuals to limit in-person contact or modify contact (using personal protective equipment) (Azzi-Huck & Shmis, 2020; McCall et al., 2020). Strategies used for flattening the epidemic curve ranged from overall personal hygiene and physical distancing to governmental restriction of non-essential

travel to and from countries and areas affected by the outbreak (Anderson et al., 2020). These strategies used had impacts on both healthcare service and medical education.

2.2.1 Healthcare Service Impacts

The strategies, containment and mitigation, used during COVID-19 included social distancing, vaccinations and the development of treatments (Madhav et al., 2018). Social distancing and limitations on social gathering were applied in many countries to limit transmission and contain healthcare demands and loss of life, whilst vaccines and treatments were being developed (Anderson et al., 2020).

Large-scale outbreaks of infectious disease, or pandemics, can increase morbidity and mortality as well as significant economic, social and political disruption (Madhav et al., 2018). The increase in global travel and urbanisation is among the contributors to the increase in pandemics, which makes it more challenging to mitigate their impact. When a pandemic is significantly associated with morbidity and mortality, it is more likely to overwhelm health systems and has impacts on sectors other than health services, for example, healthcare education (Ferrel & Ryan, 2020). Therefore, a resilient system to manage infectious disease outbreaks is required (Moon et al., 2015).

Changes in educational policy and practice around the world were provoked as a result of the pandemic, associated with the need for social distancing, triggering changing perspectives on the value and use of Distance Learning (DL) and Information and Communication Technology (ICT) (Ferrel & Ryan, 2020). Understanding the needs of healthcare and medical education during the pandemic and how they responded to changes holds opportunities for educationalists and researchers of education to consider possible futures; how can students be prepared for clinical practice in effective ways, harnessing what has been learned through the pandemic (Ferrel & Ryan, 2020)?

During times of disruption, when learners' conditions and contexts are subject to change, it is expected that pedagogical and technological modifications will be necessary (Arandjelovic et al., 2020). Challenges noted for educators and learners, as they moved from in-person

interactions to more online modes, included orientating to new educational platforms (e.g. Zoom, Skype, MS Teams) (Madsen, 2020). Moving to a time when effective viral control is emerging, institutions and educators then need to develop strategies to enhance learners' experiences (Anderson et al., 2020).

As healthcare systems were stretched to and beyond capacity due to the pandemic, disruptions in medical education, especially learning in the clinical setting were unavoidable (Mian & Khan, 2020). Adaptations were urgently required to replace in-person teaching with virtual/online learning opportunities, which may also hold value in future scenarios where access to clinical settings is restricted (Arandjelovic et al., 2020). The next 'normal' of medical education including SBME was potentially being expressed as a response or adaptation to the global disruption of the pandemic.

As the COVID-19 pandemic continues to spread, the preparedness and response of medical education/educators has been evolving (Arandjelovic et al., 2020; Ferrel & Ryan, 2020; Mian & Khan, 2020). At the beginning of the pandemic, numerous medical schools suspended all face-to-face teaching and clinical placements to limit the viral spread. Despite most medical schools having technological means to support the delivery of blended and online learning, the scale of the disruption meant that there were challenges for learners and educators in adapting some in-person learning to alternative modes (Arandjelovic et al., 2020; Ferrel & Ryan, 2020).

Curtailing in-person interactions was one of the strategies used to minimise pandemic spread and has led to greater use of distance and technology-enhanced learning pedagogies, online-based teaching and telehealth services. Although there have been a variety of techniques used to increase interactive online sessions, the broad cancellation of in-person medical classes led many faculties to highlight concerns on the irreplaceable value of attending in-person sessions, the engagement in real-time feedback and collaborative experiences (Ferrel & Ryan, 2020).

While containments and mitigations seem to present a logical solution, lockdowns and prolonged closures have been found to have a negative impact on society (Anderson et al., 2020; Azzi-Huck & Shmis, 2020). Without proper disruptive innovation, the impact on education

has been proposed to be negative in many settings (Azzi-Huck & Shmis, 2020). The time of disruption is set to have profound consequences during and after the pandemic. Teleteaching, which refers to distance education, and telemedicine, which involves distance clinical practice, may prove to be an apt solution to promote student participation and interaction where student-patient engagement is still necessary, and relevant skills are developed. However, teleteaching does not substitute in-person patient contact (Mian & Khan, 2020).

From the issues raised, teaching during the pandemic disruption requires innovative thinking about how SBME can support medical students in achieving the required learning outcomes, including those necessary for graduation. Using the three horizons of Transformative Innovation (TI) (Leicester, 2016) framework coupled with the Normalization Process Theory (NPT) (May & Finch, 2009), an understanding of social change, pattern of activities and interactions related to SBME can illuminate the shifts from the established SBME pedagogies to new/revised approaches.

2.2.2 COVID-19 and Medical Education

The COVID-19 pandemic has demonstrated that it can paralyse healthcare systems and present unique challenges for the delivery of innovative healthcare and medical education (Arandjelovic et al., 2020; Ferrel & Ryan, 2020). The previous routines in hospitals, medical schools and beyond have been disrupted by COVID-19 and much is unknown regarding the long-lasting impact of COVID-19 on medical education (Ferrel & Ryan, 2020). It is therefore apt to study the transformation at a time close to the changes. With the decision to relax social distancing measures occurring through 2021-2022 in the UK and Thai contexts, the responses may involve a combination of interventions. A small amount of literature describes what happened during the pandemic in the educational context when the practicum was removed from physical schooling spaces and how the 'practice space of medical practice' was relocated in online spaces (Ferrel & Ryan, 2020; Kidd & Murray, 2020). This gives an insight into the modification of educators' practices, underpinned by their strong traditional face-to-face value systems. However, questions arise about the sustainability of work for educators as personal and professional boundaries blur, with personal and professional relationships and responsibilities

often simultaneously present, as homes and virtual communities become (professional) learning spaces. Arguably, there were many challenges for this educational group than ever before.

The question is, after the pandemic, what will become of these new spaces and pedagogical innovations? Within the literature that has been produced, various frameworks have been developed in an attempt to innovate and implement alternative approaches (Petricaa et al., 2021; Steehler et al., 2021; Sukumar et al., 2021). In order to understand how disruptive knowledge is used and created, it is important to explore and understand the differences between steps of knowledge translation as well as the nature of medical education assets available. The next section outlines various arguments related to the assets of medical education and how they are created and innovated.

2.2.3 COVID-19 and Medical Education Assets

There is no doubt that the hospital environment remains rich in learning opportunities for medical students and that students need to learn the skills necessary to succeed as a student and practicing doctor. However, before the pandemic, there was a sense that medical education in developed nations was aligned with society's current and future healthcare needs (Kopelman, 2014). The COVID-19 experience has led some observers to call for a new model of medical education, which would incorporate the strengths of integrated curricula design and technology enhanced medical educational model but eliminate the model's major weakness – a lack of connection or face-to-face interaction among the different learning experiences (Mian & Khan, 2020).

At the time of writing this thesis, it is worth noting that while some communities continue to hold in-person meetings and teaching sessions, others are separated geographically and rely on distance communication technology to interact (Arandjelovic et al., 2020; Ferrel & Ryan, 2020). In public life, conversational online media, such as webinars, Facebook, and Twitter, have increasingly provided valuable social data for understanding social awareness and analysing public opinion or sentiment on specific issues (Bright et al., 2014; Gegenfurtner & Ebner, 2019). In the field of medicine, virtual medical communities have also been utilised to enhance

knowledge sharing, foster knowledge creation, and facilitate collaboration among healthcare practitioners (Rolls et al., 2019; Sims, 2018). The combination of face-to-face learning and distance learning components has demonstrated its potential, supported by technologies that facilitate the connection between people, conversations, information, and knowledge.

2.3 Simulation Based Medical Education and COVID-19: Terminology and the Criterion

The use of medical simulation for teaching and assessment is becoming increasingly accepted globally. This is because it improves patient safety and doctor-patient communication (Aggarwal et al., 2010; Forsythe, 2009). SBME has faced resistance in the past due to its cost and the fact that it is a relatively new teaching method. Over time, the combination of patient safety awareness, the advancement in technology and the implementation of simulation-based medical education (SBME) as alternative for traditional clinical skills teaching was the main reason that there have been a wide range of simulation activities growing over the decades (Bradley, 2006a; Jones, Passos-neto, et al., 2015).

2.3.1 Terminology

The literature suggests that 'SBME' is a technique that can be used as a substitution for learning with and from real patients in clinical settings (McKimm & Forrest, 2013). McKimm & Forrest (2013) noted that the technique used in training is increasingly embraced in undergraduate and postgraduate contexts, both in clinical and non-clinical settings. It has been claimed that simulation is a good learning technique as it can provide the opportunity to plan according to learner's need and incorporate feedback appropriately (Ostergaard & Rosenberg, 2013). SBME is seen to complement medical education in patient care settings under the right conditions. The essential features that lead to effective learning include the fidelity of medical simulation (Jones, Passos-neto, et al., 2015), feedback provision (Bradley, 2003), repetitiveness (Ziv et al., 2005), curriculum integration (Nehring & Lashley, 2009), and outcome measurement ability (Brydges et al., 2015). These factors, when used in combination, make it possible for SBME to be adopted and for learners to effectively transfer the skills they have acquired to the real clinical environment.

This thesis pays attention to the implementation including the innovative implementation of SBME during the pandemic disruption. The term 'blended SBME' is used to describe SBME which has both in-person or on-site component and online component (QAA, 2020). Within the term blended learning, 'blended' is more a combination of a number of face-to-face teaching tools within an online learning environment (Morton et al., 2016) and requires the thoughtful integration to create the correct balance between the two components (Lai et al., 2016).

2.3.2 The criterion

A narrative literature review was conducted to explore issues of SBME, in UG medicine, in relation to context, innovation, implementation and the experience of educators. The narrative approach was used as it highlights the significance of interpretation and the importance of understanding study findings relative to their contexts (Bryman, 2012). The narrative review incorporates some of a systemic review, such as the use of questions to guide the review and the combination of key terms for searching for literature and the use of appraisal criteria (Table 2.1). The following research questions were used to frame the review questions:

- How do the contextual factors influence SBME implementation and innovation?
- What SBME implementation and innovation factors are experienced by educators?
- How do implementors in different contexts innovate and what influences do those innovation have on SBME implementation?

Table 2.1: Inclusion and exclusion criteria applied to the literature.

Inclusion criteria	Exclusion criteria	Rationale for decisions
- Journal articles and books must be peer reviewed - Journal articles must be full-text articles - Journal articles and books must be written in English or Thai - Articles or books must be related to one or more of the following -Undergraduate medicine -Simulation Based Medical Education -COVID-19	- Policy reviews were excluded - Book reviews were excluded - Non-peer reviewed literatures were excluded - Article not available in full text	- Peer reviewed books and articles assure a degree of quality. - Both quantitative and qualitative studies were selected because these can provide a rich account of contextuality, qualitative studies are the preferred studies.

Criteria

Restrictions were not applied to the date of publication, although the selection of the articles in relation to SBME and innovation intervention identified articles that had been published since 2020.

Search Terms and Data Bases

The institutional research searching resource at the University of Dundee was used to support the search. Search terms were entered and outputs were generated from EMBASE and PUBMED databases. The key databases were selected to provide comprehensive and accessible full text databases of research in medical education, simulation and implementation. The search terms shown in Table 2.2: Search terms.

Table 2.2: Search Terms used for the Literature Search Strategy (EMBASE and PubMed databases)

Single word/phrase search terms	Boolean search terms	Rationale
Undergraduate medicine Simulation-based medical education COVID	Simulation based medical education AND Undergraduate medicine Simulation based medical education AND COVID Simulation based medical education AND Undergraduate medicine AND COVID	The terms SBME/SBM are interchangeably used and more often used in full. The search was widened to include terms 'undergraduate', 'undergraduate medicine' and 'teaching and assessment' to ensure that the study fields were covered.

2.3.3 SBME in the Time of COVID-19 Pandemic

Aligning with the clinical procedures, two databases (PUBMED, EMBASE) were electronically searched. These two databases were selected as they include most of the medical/health professions education journals. Inclusion criteria for the articles that were finally included in the review as followed:

- Simulation based medical education: articles including simple and more complex and technical and non-technical simulation
- Undergraduate medicine: articles that investigate the implementation of SBME in UG medicine programmes
- COVID-19: articles that relate the SBME implementation and innovation in response to the pandemic

The electronic files were reviewed (see Figure 2.1). Initially, these were checked for their title, summary, language of publication and accessibility of their text. The articles with irrelevant title or summary to the subject of the review were removed, as well as those for which the text could not be accessed or the text was not available in English, a total of 299. Full-text articles

(n=243) were evaluated for eligibility according to the criteria. 194 of the 243 full-text article available in English language were excluded as some of the articles had a study population that was other undergraduate healthcare professionals rather than undergraduate medical students or the results of the research were not qualified and insufficiently related to SBME and COVID-19.

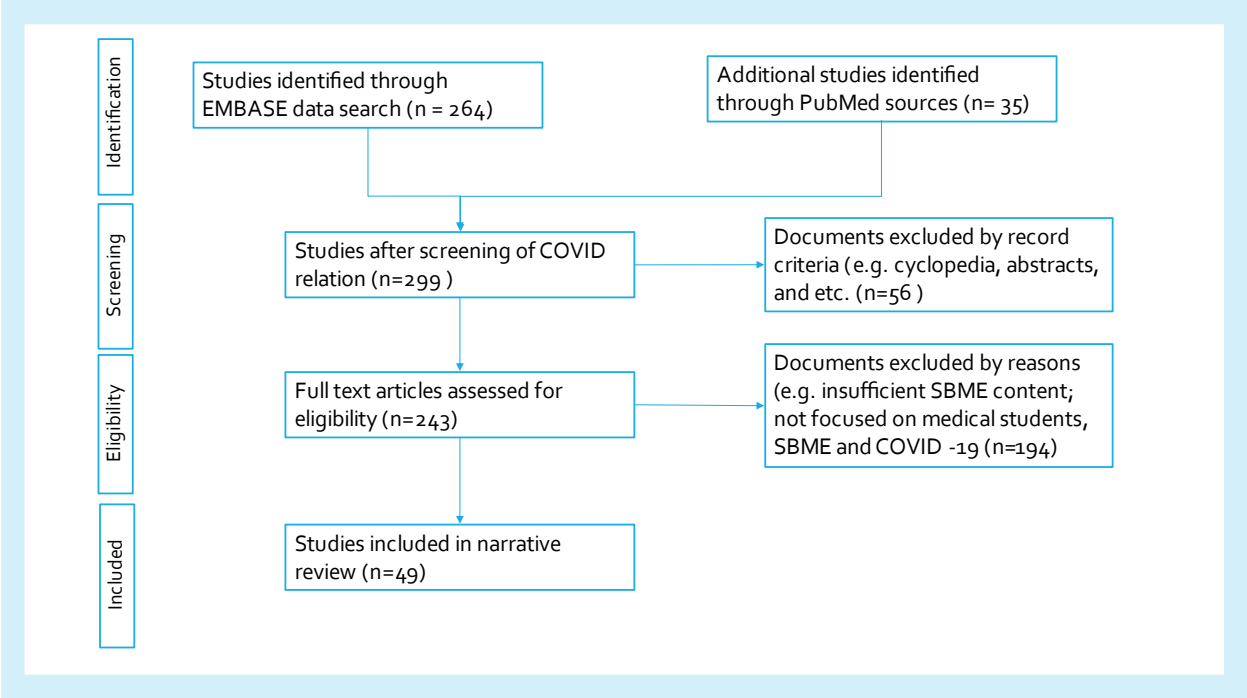


Figure 2.1: PRISMA Flowchart Diagram

Coding the Literature

The articles were coded to identify key themes. The process was performed electronically. Each article, during the evaluation for eligibility, was examined and potential themes were identified. The first article (1P) was chosen first because it aligned closely with the focus of the research. It examines the innovative implementation of a new virtual program in medicine, it was conducted during the pandemic. The other articles were then reviewed to identify new or similar themes. The researcher's subjective judgement influenced the identification of the theme shown in Table 2.3 below.

Table 2.3: Coding Applied in the Literature Selected for Inclusion

Number	Codes	Identification number of the articles coded
1	Distance/Online learning/blended learning (Technique and effectiveness)	2E/3E/13E/26E 4P/12P/13P/14P/15P/16P/17P/18P/22P
2	Blended SBME as a solution for real patient exposure limitations	4E/6E/8E/12E/16E/18E/19E/20E/23E 1P/2P/5P/6P/10P/19P/20P/21P
3	Student perceptions of SBME	1E/5E/9E/22E/24E/25E/27E 3P/11P
4	Impact of COVID	7E/14E/15E/17E/21E 9P
5	Assessment and evaluation	10E/11E 8P
6	Faculty perception/development	7P

E: EMBASE/P: PUBMED

The articles selected and the related content was coded to identify key themes. Of the 49 articles included in the review, the oldest was published in 2020 and the most recent was published in 2022. This shows the growing trend of the implementation of SBME in medical educational processes.

Summary tables of the included studies are in Appendix 1. The study populations were from a range of departments, medical schools and countries. In 14 of 49 articles, they were investigating and explaining how the institutions combined teaching approaches to navigate the pandemic. 14 additional articles reported SBME as one of the main teaching approaches that could replace or provide a solution for the reduced student-patient interaction/learning opportunities challenge. Nine articles concerned students' perceptions of the changes to their learning experiences and the quality of the innovative modalities. Six articles evaluated the impacts of the pandemic and how the institutes view the future of teaching approaches. Three appraised and reflected on the implementation of a blended learning approach provided to the students. Last but not least, there was one article that addressed faculty perception and development.

The following section presents the findings from this narrative review. From the coding activity two key themes emerged: Innovative approaches and blended SBME and challenges. The two following key themes are discussed as follows.

2.3.4 Innovative Approaches in Medical Education

Medical education, training and practice experienced a significant change during the pandemic, primarily due to the reduced number of patient encounters and social distancing guidelines (Afonso et al., 2020; Steehler et al., 2021; Williams et al., 2021). This decline in case volume resulted in significant changes in UG medical education (Majumder et al., 2021). Many courses and their activities were limited, postponed, or cancelled, with consequences for tutors and students. Through the disruption there was emergent innovation of the pre-COVID-19 teaching approaches to enable learning with social distancing. This involved using new models of education, which combined fully online learning components with modified, in-person sessions, resulting in a blended teaching approach. Innovative transformations were required, considering the volatile landscape of medical education. Institutions involved in medical education, universities and healthcare providers needed to move to rapid collaborative action to respond to the retranslation of SBME and incorporate accessible technologies to mediate for the loss of the workplace-based teaching/learning opportunities (Behmadi et al., 2021; Hollander & Carr, 2020). To maintain the quality of teaching and navigate the challenges from new ways of teaching and planning learning, institutions were mindful of the need to continue to develop and identify new ways to enable medical student learning, in a safe environment (Ghita Hjiej et al., 2022; Sindiani et al., 2020)

Medical education institutes worldwide incorporated social distancing guidance and responsive course design to continue to deliver and facilitate COVID-19 teaching and learning (Majumder et al., 2021). Alternative social distance teaching was innovatively developed and implemented and included using protective devices, spaced student-tutor-student interactions and remotely facilitated learning using online platforms (Salman, 2021). Face-to-face interactions were reduced, postponed, or cancelled. In many countries, as the onsite patient encounter being significantly decreased, SBME and virtual learning were used as a combination by replacing

face-to-face teaching and learning components (Afonso et al., 2020; Chadha et al., 2021). In the most impacted stage of the pandemic, the majority of medical students were urged to learn from home, with some of the more senior year students being temporarily deployed as healthcare workers (Park et al., 2021). During the initial phases of the pandemic, many medical schools suspended clinical attachments and in-person SBME sessions. Didactic SBME sessions for undergraduate medical students were introduced, using online learning platforms or in blended modes. Like many other aspects of life, medical students' interactions, as a means of learning, proved vulnerable to the impact of the pandemic (Ingrassia et al., 2020).

The pandemic led to many challenges in continuing to offer undergraduate medicine programmes (Mian & Khan, 2020). A study regarding the educational impact of COVID-19 revealed negative impact on students' health and ability to engage and apprehend the education delivered (Dhara et al., 2021; Ghita Hjiej et al., 2022). Another study identified that the COVID-19 pandemic significantly decreased student-patient interactions, reflecting the need for simulated patients (Kapoor et al., 2021). These alternatives have been a popular choice with undergraduates as an aid to supplement teaching, despite the associated cost and technological and geographical barriers (Patel et al., 2021; Taylor et al., 2022).

Developing banks of online patient cases for undergraduate students seems to be able to compensate partially for the shortage of clinical experiences, as both fictional and real case-based scenarios can be incorporated (Majumder et al., 2021; Sukumar et al., 2021). These cases, however, require purposeful integrative channels to support students to use them as part of learning activities (Chadha et al., 2021; Patel et al., 2021).

Learning from a distance using technological solutions have proven to be helpful in SBME teaching and assessment (Bußenius et al., 2021; Williams et al., 2021). They support learning of both technical and non-technical SBME in practicing medicine via online communication systems and it is arguably still able to provide a student-centred approach (Afonso et al., 2020). In addition to depicting written or face-to-face cases, when incorporated in virtual/augmented reality, technological solutions potentiated SBME by making it a more interactive learning experience in the time of pandemic (Chao et al., 2021; Sukumar et al., 2021). These studies

reported that blended SBME can be integrated into existing curricula as effective learning strategies, as they address the gap in teaching and learning resulting from the restrictions on in-person and with-patient interactions. Therefore, it is highly probable that distance learning in medical education will continue to persist and become an integral aspect of future medical curricula for students. As the COVID-19 pandemic continues to develop, and with the gradual resumption of academic activities and services, further possibilities for delivering education through online channels such as webinars and virtual classes may emerge.

2.3.5 Blended SBME and Challenges

Strategies and tools should be used to gain participation and develop collaboration in blended teaching and learning during the disruptive environment (Cronje, 2021). Practical and appropriate blended strategies can be used depending on the learning outcomes and context. The pandemic posed a challenge to educators and curriculum developers to consider what an effective environment for delivering blended learning approaches, with a combination of the lectures, virtual classrooms, and virtual communication and discussion might look like (Currie et al., 2020).

With the reduced numbers of patient encounters, medical students may face the quality control challenges, such as those mandated related to expectations of clinical experiences or assessment types required (Ray et al., 2021). Significant reductions of in-person patient encounters and face-to-face interactions could have a negative impact on training and learning. Although in places online case studies and simulations (i.e., diagnostic reasoning and medical management discussions) have been used to replace face-to-face teaching and real patient encounters, the effectiveness of these blended teachings remains questionable and led to a creation of virtual clinical activities providing virtual clinical exposure (Sukumar et al., 2021).

Review of the impact of COVID-19 on innovative medical education has recognised the challenges and the effectiveness of approaches and methods used (Patel et al., 2021; Ray et al., 2021). The relatively rapid move to online modes of teaching and learning raised challenges for students and educators, in particular related to the use of new technologies (Chao et al., 2021).

Choa et al. (2021) notes challenges that were technical, logistical and legal in the delivery of the blended sessions, for example, considering the legal position of sharing patient information or patient dialogue online. As well as quality assurance, stakeholders' perceptions and feedback have been affected. This is a clear indication that staff and student perception have also been of concerned, particularly a negative psychological impact. Personal psychological impact is a possible result of increased demand for practical knowledge through safer face-to-face teaching, which may be restricted by the situation. Although positive feedback for innovative SBME used in the time of pandemic may support the existence of innovation, the cost of designing interactive platforms and the lack of resources available impede the utilization in wider medical education (Dhara et al., 2021).

Distance learning technology is relatively new to clinical and SBME learning platform, and proved to have enormous potential during the pandemic. The development of distance-based medical education learning tools could be provided on students' personal journeys, which would make the adaptation of the distance learning technology in medical education far more acceptable and accessible. The field of SBME offers opportunities for tutors to create a simulated clinical exposure, offering students the opportunity to expose clinical cases when in-person learning is not possible. This highlights the importance of technologies to ensure student's learning is continued but hardly mentions the processes of optimizing these innovations.

In the next section the importance of the context in influencing the implementation of SBME is explained, drawing on the history and evolution of UG medical education, the rise of outcomes-based education, the emergence of SBME and associated pedagogies.

2.4 Context of Undergraduate Medicine: The Significance of History

The historic Flexner report, ''Medical Education in the United States and Canada'' (1910), set forth many of the standards shaping current day UG medical education including the traditional two years of basic science followed by two years of clinical science. Despite a century of evolution of knowledge in basic and clinical sciences as well as advancements in teaching

strategies, this curriculum format still persists in many medical schools around the world (Brauer & Ferguson, 2015). Hence it is not unusual for medical students to be taught almost the same way they were decades ago (Jones, Passos-Neto, et al., 2015). In terms of demand, the rapid rise of and subsequent demand for providers to be able to holistically integrate population health, health policy, healthcare delivery systems and interdisciplinary care as demanded in the twenty first century have made the traditional curricular structure to be re-viewed as an inadequate system to prepare future physicians (Brauer & Ferguson, 2015; McKimm, 2007). There is uncertainty about how these issues, alongside other medical advances and global changes, are going to be delivered to meet the medical education needs and healthcare systems should these trends be realised, and teaching patterns remain unchanged.

2.4.1 The Problem with Traditional Curricula and the Embeddedness of Integrated Outcome-based Curricula

Before the pandemic, and for several decades, concerns were raised about curricula in medical education being overloaded or crowded with content (Kopelman, 2014). The traditional medical curriculum through the twentieth century was based on a pre-clinical phase of studying the basic sciences anatomy, physiology, biochemistry and pharmacology, followed by an apprenticeship experience (Irby et al., 2010). Quality assurance processes were introduced to improve academic standards in the 1910s (Beck, 2004). A critique emerged of the traditional programme format, around the inadequate exposure of learners to learning in health and care settings and highlighted the importance of a focus on clinical care and safety at the early stages of UG medicine. This prompted the development of more integrated curriculum models, where aspects of clinical care are introduced earlier along with patient/case focused learning, for example, problem-based learning (Norman, 2012).

The rise of complexity in medical education needs, both from a technical point of view and in terms of limitations of healthcare system availability, has generally been taken into account in developing medical curricula, but this is without optimal guidance on how to develop health professionals' competence (Custers & Cate, 2018). A range of factors demand revision of medical curricula including increasing student numbers, the need to include development of

transferable skills and drives to increase multi-professional learning (McKimm, 2007; McKimm & Jones, 2018). These demands are based on relevant, contemporary contextual factors, and reflect trends towards more integrated approaches as well as stressing the importance of technology which can enable more flexible teaching delivery (McKimm, 2007) and provide additional clinical or carefully engineered simulated learning settings (Boonmak et al., 2017; Norman, 2012).

The shift towards integrated medical education accelerated throughout the latter part of the twentieth century in Europe and North America (Roberts, 2004). During this era, the integrated curriculum was underpinned by 'constructivism', whereby the use of student-centred, problem-based, and rationalised body systems-based studies were promoted through an understanding of individual student learning needs (Masters & Gibbs, 2007). This subsequently became the more dominant curriculum design thinking, versus the more opportunistic apprenticeship mode (Kopelman, 2014). This rationalisation was deemed an entirely necessary approach to medical education at the institutional and national level given the need to provide relevant teaching and assessment in response to a changing global healthcare landscape (Dornan, 2005).

To promote the retention of knowledge across the basic and applied sciences, the more 'integrated curriculum' model, has been acknowledged as a practical solution (Boonmak et al., 2022; Brauer & Ferguson, 2015). As medical graduates must have a significant body of knowledge and skills that link basic science material with clinical problems, the organisation of teaching does matter. Decisions about the use of problem-based or case-based learning concepts and design to make connections between basic and clinical sciences need to be considered by medical educators. The transformation towards more student-directed, problem-based, and integrated models to improve knowledge and increase engagement seem to demonstrate good results for the present-day curriculum renewal (Brauer & Ferguson, 2015; F. Jones et al., 2015).

The approach to teaching, pedagogy, and its role play an important part in medical education teaching as the variety of medical education stakeholders may take or accept different approaches to pedagogy (Tredinnick-Rowe, 2018). Tredinnick-Rowe (2018) proposed that the

development in the pedagogy of clinical medicine can help to create the curriculum fit for 21st century's needs from healthcare services and medical education. There is an imperative for clinical professionals to engage in learning about clinical teaching and learning. However, the study of clinical pedagogy is not as prevalent as other areas e.g., basic science teaching. SBME has become a commonly used pedagogy because of advances in technology, increasing attention to patient safety, and greater awareness of active learning as a core principle within adult learning (Coombs et al., 2017). Distance education drives the need for a pedagogical shift as a result of the lack of human contact and feelings of isolation (Miller & King, 2003).

The development of pedagogy requires the input from public, patient partners and from other clinical professionals, to develop these in an inclusive manner. This is a desirable situation as embedded 'integrated' curricula mean that tutors, learners and teaching matters are connected ('break down barriers between basic and clinical sciences') and continued ('promote retention of knowledge and acquisition of skills through repetitive and progressive development of concepts and their applications') (Brauer & Ferguson, 2015, P. 312). This is an important point as promoting educational continuity is central to the 21st century pre COVID-19 model of medical education (Brauer & Ferguson, 2015). The concept is complex and has associated challenges.

In the early days, it was complicated by the traditional division of the core clinical experience into a disconnected series of independently delivered. The discipline-specific, randomly ordered, sequential blocks, each characterized by patient assignments and unfriendly coordinated learning objectives were used to provide opportunities for a more collective approach to curriculum design and management (Hirsh et al., 2007). Hirsh et al. (2007) argues that medical schools have begun to assume more centralized control of the clinical experiences in order to better deal with the so-called 'orphan topics'. Over the past decade, there has been a shift in governance that has allowed for the development of a variety of new models of clinical experiences. Many of these models have incorporated elements of educational continuity into the overall learning experience. For example, intersessions or interclerkships are courses of about a week's duration that are interposed between sequential clerkships.

Longitudinal themes or threads are another type of course that links similar content between clerkships. Constructivist and experiential learning underpin the approach of the pre COVID-19 medical education.

In many medical schools, core materials are presented as longitudinal “themes” or “threads” bridging two or more discipline-specific clerkships as dictated by nature of the experiences required to achieve competence in healthcare systems (Hirsh et al., 2007). Many of these new medical education experiences have used small-group, problem-based learning, which was new to the pre-clinical curriculum, alongside traditional discipline-specific clinical placements (clerkships) (Harden et al., 1997). A variant of problem-based learning has been introduced at the medical schools to integrate content across the entire curriculum (Brauer & Ferguson, 2015). Later, outcome- and task-based learning has also been introduced and used to integrate the clinical experience. This approach separates the clinical work from the learning process and involves generating a series of predetermined tasks for the students, who are responsible for finding opportunities to explore and build their skills on these tasks (Harden et al., 2000). The embeddedness of outcome- and task-based learning has been credited with enhancing a student-centered approach to clinical education. This approach transfers the role of the tutor from providing information to facilitating opportunities for constructive integration of core content across clinical disciplines. Through this collaborative relationship, students are better able to transfer their learning to new situations (Meirovich et al., 2016).

2.4.2 The Emergence and Embeddedness of ‘Conventional’ SBME

The above initiations resulted in the recognition of disparities in the expected learning outcomes among medical schools. This encouraged the medical education system’s leaders to focus on learning outcomes and processes rather than memorising and reproducing factual data (Daneman & Benatar, 2019). Medical students are urged to get involved in service and become familiarise with their healthcare system as much as current regulations permit (Dornan, 2005). This variety of pressures changed and forced some curriculum integration such as the introduction of case-based and problem-based Learning. This later explained how the ‘engineered simulated clinical environment’ becomes a factor for transferring clinical skills

where the exposure to real clinical setting become undeniably far from optimal (Norman, 2012). It can be seen that medical schools are a complex system where the production of competent doctors is driven by the needs of healthcare (Quintero, 2014; Roberts, 2004).

The emerging pedagogies within medical education are identified as facilitating changes in the way medicine is taught to meet the healthcare service needs (Tredinnick-Rowe, 2018). In additional to the continuity of care, one of the overarching pedagogies that cuts cross all clinical related disciplines is to involve patient and the public through patient and public involvement (PPI). It can be seen from the current curriculum that the patient involvement in medical education manifests in a variety of courses from clinical and non-clinical aspects, especially from technical and non-technical SBME. Tredinnick-Rowe (2018) provide additional commented that continuity of care and PPI can be reflected through the division between subjects and themes existing in each discipline, where patients' characteristics play in important role in education of health-related students. This learning experience can be safely constructed and also simulated through SBME, ranging in degree of complexity and across disciplines (Ziv et al., 2005). Ziv et al. (2005) comment that this SBME can creates a powerful learning experience and contribute to improvement in clinical performance and reduction of errors.

Change initiatives often fail when elements of change that were not previously used or planned for are introduced. This is because medical schools require visionary leadership, innovative resource management, and careful attention to learning, cultural, and regulatory issues for successful implementation (Hirsh et al., 2007). Organizations that can provide those forms of support are well-equipped to deal effectively with the problems experienced by stakeholders. They are able to ensure that appropriate design and implementation are taken when unanticipated results occur as a result of change. Despite many educators having experienced difficulties when they have to introduce integrated clinical teaching, the recognition of these issues and addressing them by the medical school enables the educators to innovate appropriate solutions.

As one of emerging pedagogical perspectives, simulation can be used as a pedagogical learning method to obtain clinical related knowledge and skills as it can co-produce clinical experiences

(Akselbo et al., 2020; Boonmak et al., 2022). Since a medical simulation can focus on themes that emerge in several areas across a curriculum, it is to be expected that there is significant scope for the development of pedagogical strategies across the areas (Tredinnick-Rowe, 2018). The role of simulation-based medical education (SBME) in medical student education is a thematic area that is relevant across all clinical disciplines. The idea of embedding SBME in medicine has been echoed by many in medical education for both technical and non-technical skills (Briggs et al., 2015; Ker, 2003). Simulation is utilised not only in clinical medicine but also in various other contexts related to health and education. It is worth noting that SBME in medical education happens both in the core modules for students and in their elective courses. Although SBME is a widely recognized agenda in medical education, its appropriate use is particularly critical for doctors at the early stages of their training and throughout their entire careers (Jones et al., 2015).

The concept of embeddedness in medical education and healthcare systems is intertwined with the learning environment, tutors, and learners. This interaction process is facilitated in carefully engineered simulated settings that enable the re-embedding of clinical practices in actual clinical environments (Norman, 2012). Within the SBME literature, the term 'interactions' is frequently used to describe the range of complex human interactions that can be replicated in simulated clinical settings. These interactions can range from basic training exercises such as chest insertion to more complex scenarios involving the deployment of entire hospital units (Bradley, 2006; Schofield et al., 2017). This is because all clinical interactions are socially embedded to varying degrees (Bokken et al., 2009). Bradley (2006b) also argued that clinical interaction is inherently embedded within a complex clinical practice, rather than occurring in an abstract independent setting. In essence, the term interaction implies that re-production of clinical practices is key to understand how existing medical education institutions function and have evolved over time (Bradley, 2006).

The concept of educational continuity provides a sufficiently broad framework to accommodate the development and evaluation of various integration models (Hirsh et al., 2007). It has been identified as the primary epistemic cognition in modern medical education preceding the

COVID-19 pandemic (Eastwood et al., 2017). In the UK, the traditional apprenticeship model has faced a similar situation in which the traditional bedside teaching has been less exposed by both tutors and students (Dornan, 2005). There are several reasons that placed the situation under severe strains, for example, an increase of patient rights, a decreased length of stay, and an increased number of learners. Many organizations face discrepancies between their implementation and the social conditions they operate in, which can affect their ability to maintain the courses they offer to students. Arguably, the process of social interaction facilitates practices that lead to skill improvement and retention. This, in turn, allows the clinical practices within healthcare systems to become more "socialised" and "systematised," prioritizing learning outcomes over solely outcome-based spiral curriculum logic. It is to this end where the narrative now turns to critically discussing 'social distancing' and changing medical education landscape as possible 'innovation', before exploring blended SBME more specifically as mechanisms that enable the (re)appearing of the (distance) interactions in SBME.

2.4.3 The Context of Conventional SBME Teaching (Pedagogy)

A pragmatic pedagogy for designing a simulation session as an educational intervention centres on the learner in order to enable individual learners to maximize their learning in a particular context (Dieckmann & Ringsted, 2013). Before the pandemic, medical simulations were one of the new face-to-face teaching pedagogies used across different areas of medicine, with other online learnings such as flipped classroom models being less used in medicine (Tredinnick-Rowe, 2018). During the disruption, the effect of social distancing existed not only in the normal clinical activities, but also during the normal SBME learning activities. This situation called for alternative approaches to teaching, learning and assessment. Accordingly, a transformative innovation for constructing this imminent SBME to promote proper pedagogy was essential for the success of SBME and medical education delivery. The quality of SBME delivered during the social distancing period was also vital. A successful implementation of SBME for various settings depended on stakeholders participating in the teaching and learning activities in the teaching spaces.

General Medical Council describes conventional SBME as ‘integral’ to teaching and learning in medical education as the ‘learner must have access to technology enhanced and simulation-based learning opportunities within their training programme as required by their curriculum’ (General Medical Council, 2015b, P. 14). It is this requirement which enables students and educators to be able to learn and teach in a simulated environment and culture that is safe, open and provides a good standard for their learning experience and prepares them for graduate life. It would be incorrect to view SBME as another method of learning in a clinical setting. Dornan (2005) makes a clear differentiation between the role of SBME in regard to the substitution of reality with SBME being recommended for students experiencing traditional bed side teaching.

This is an important distinction to make given the current focus on undergraduate medicine and the employment of simulation-based medical education. It demonstrates that the role of SBME is to bridge the increasing gap between optimal strategies and the real clinical environment, which can benefit students throughout their lives, rather than to provide learning experiences that closely approximate real clinical settings, such as the internet, policies, practices, and experiences. It is therefore important for educators involved in SBME to be able to access a wide range of information and receive appropriate support to filter and transform information into knowledge which can be used to sufficiently offer clinical experience to the students.

The wide range of activities undertaken by SBME educators reflects that there are also many processes and tasks involved in the delivery of student-centred SBME (Kaewpetch et al., 2021; McGaghie et al., 2011). Norman (2012) described the processes of using simulation as a method to create an environment for students to work through cases that represent the learning outcomes and required procedural and non-technical skills for practice. Davis (2003) describes critical uses which have taken place in the medicine competency assessment and how SBME has developed beyond simply teaching students about clinical related skills. SBME now also helps construct and retain students' skills, and better prepares them for the procedures they will encounter in practice. As student development has attracted greater focus, the role of

SBME as a reality substitute has broadened and now requires an array of medical skills and knowledge to underpin learning outcomes (Kaewpetch et al., 2021).

The requirement for students' learning continuity poses a challenge to medical schools (Hirsh et al., 2007). Lane et al. (2001) contended that a wide variety of models for SBME needs to map to different learning styles. They described that how SBME are used depends on the curriculum and culture of the medical schools and training programmes mapped with different disciplines and developments. The authors emphasised that economic considerations continue to dictate the capability and capacity of the medical schools in terms of teaching and evaluating skills using low- and high-fidelity simulation. The educators have responsibility to be open to a variety of choices because of the complexity of the task they are involved in and as they come from a range of disciplines with different perspectives. The range of processes involved in SBME teaching, the recent changes that have taken place and the complexities that exist within the micro and macro systems, structures and policies used by educators also provide a critical insight into how the SBME is used, produced and managed. Investigation into the implementation and transformation involved therefore has implications for wider medical education, rather than being confined to one medical school.

Passing on the hidden nature and culture of practice in medicine is another factor which influences the delivery of SBME to students (Boonmak et al., 2017; Maran et al., 2013). The cultural factor adds complexity to the development of effective SBME pedagogy to support learning. There is no ideal approach to the teaching involved as the development of SBME depends on the needs of health services and values of the medical schools and training programs, which can vary widely. When the medical education system emphasises the need for medical schools to provide technology-enhanced learning, simulation-based learning has demonstrated its potential as an effective training tool for medical students. While McKimm & Jones (2018) described that the cultural context can inhibit effective delivery of the curriculum, Jones et al. (2015) argued that SBME has proven to have many advantages as it can be tailored to support teaching in different types of disciplines. Lane et al. (2001) described simulation techniques and models and some of their specific applications which are supporting all areas of

UG medical education as well as extra-curricular activities. In the literature, it was found that medical education institutions employ various models that differ in the type of simulations employed, such as simulated patient encounters, screen-based simulations, and realistic interactive simulations.

Kneebone (2009) believes that SBME is valuable in maximising the chance of acquiring adaptive expertise and that an effective SBME educator assists students in taking responsibility for their own learning by guiding them through the different stages of the learning process. This demonstrates the shift that has taken place in medical education over recent decades where student are now expected to take an increased role in their own development, and educators are required to facilitate these new ways of learning and manage the processes involved (Meirovich et al., 2016).

To provide effective teaching to students, SBME teams must have clarity on the teaching practice (pedagogy) and the expectations placed upon them. Harden et al. (2000) asserted that task-based learning offers a practical approach to integration and helps students to understand both the tasks themselves and the underlying concepts and mechanisms. They argued that institutes need to recognise the benefits of exposing students to different disciplines and subjects within a clinical context, as well as the responsibility of educators to assist them. They also recommended that steps be taken to address the challenges faced by educators, including task identification, the model of integration, student guidance, and assessment of learning. By understanding the range of activities and skills involved in SBME implementation, educators can have a clear picture of the overall curriculum and the inter-linkages between different tasks. It is through SBME activities and the knowledge required to facilitate them that educators can achieve this understanding and make innovations to the delivery of SBME and the support system it requires.

It is important to maintain the quality of the learning experiences and the delivery of SBME while educators find their feet in these disruptive learning and teaching environments. With the rise of technology in education and the need for geographically dispersed learning, it is crucial to comprehend the viewpoints of educators as they navigate through the spectrum of teaching

with the available technology, and from traditional face-to-face teaching to blended teaching in the COVID-19 era, to ensure the maintenance and improvement of learning and teaching quality.

This study aims to explore how SBME pedagogy has evolved by examining two UG curricula, the necessary knowledge for implementing them, and the resulting transformative innovations in the organisation. However, academic institutions are complex and involve a range of activities and systems in SBME that are interdependent. Educators need to understand the ideology and epistemology that underpins the teaching model, as well as the reasons for how tasks are executed, in order to effectively navigate this complexity. One pedagogical model within SBME plays a critical part in outcome-based education strategy, with constructivist and experiential learning theories. After the introduction of outcome-based education as the foundation for instruction, a task-based educational strategy has been employed for students for many years. This approach assists students in building upon and elaborating their existing knowledge, skills, and attitudes, and helps them progress towards learning outcomes that are relevant to healthcare needs.

2.5 Contextual Factors (Macro-micro Environmental) Impact on SBME Implementation

The changing nature of the healthcare landscape and needs has had influence on medical education (Bradley & Postlethwaite, 2003). As mentioned, the changes, such as increasing numbers of trainees, working time restrictions and shorter duration of patient exposure, have reduced opportunities for their clinical experiences, leaving trainees dissatisfied with their clinical skills (Bligh, 1995; Bradley & Bligh, 1999; Walker, 1991). This resulted in the deficiencies in a range of skills in the training being recognised as a result of changes in the healthcare landscape (Bradley, 2006; Dacre et al., 1996).

2.5.1 Macro-environment Impacts

Although there were criticisms about the traditional curriculum being overloaded with facts and dehumanising, a new integrated curriculum started to emerge in the late 1970s (Brosnan, 2011). This followed by the proliferation the amalgamated undergraduate medical curriculum

in the European and North America regions regarding changing healthcare needs and the provision of care and the development of the talking six educational concepts including Student-centred, Problem-based, Integrated, Community-based, Elective and Systematic issues (Harden et al., 1984).

Against this background, curriculum integration and early exposure to clinical skills have become globally accepted as educational goals in response to the changing needs of medical education. This includes establishing connections or continuity between different learning experiences (Bligh, 1995; Irby et al., 2010; Ledingham & Harden, 1998). In the UK, the recognition of the need for better prepared competent future doctors with appropriate skills and attitudes has been summarised in the 1993 GMC recommendations (Dacre et al., 1996; General Medical Council, 1993). Scottish medical schools are among the medical schools incorporating clinical skills units into its undergraduate programme (Bligh, 1995; The Scottish Deans' Medical Curriculum Group, 2000).

This medical education reform led to the development of clinical skills centres and simulation-based medical education which continue to provide a more flexible and safer learning environment for students to develop their clinical skills (Bradley, 2006; Ledingham & Harden, 1998; Rubin & Franchi-Christopher, 2002). Ledingham & Harden (1998) argued that developing appropriate clinical skills should be a part of the curriculum to ensure that students can apply their theoretical knowledge in a safe learning environment. As attention is paid to the anticipated outcomes, experiences and exposures to clinical skills are believed to contribute to the exit outcomes, particularly when using objective structured clinical examination (OSCE) that align with the content of the clinical skills course (Dacre et al., 1996). This could be achieved by closer co-operation between teaching and assessment and by strengthening the role of SBME to create teaching which is more co-ordinated and oriented to assessment (General Medical Council, 2009b).

Since 2002, the outcome-based model for medicine has been widely adopted by the General Medical Council (GMC) in the UK (Rubin & Franchi-Christopher, 2002), following the development of outcome-based education. This was done to increase school autonomy and

flexibility, which caused concern among traditional academics(Harden, 1999). The three-circle outcome model in medical education was described and developed as a structured format to present essential areas of learning outcomes. Harden (1999) focused on defining and explaining the advantages of the outcome-based education. Unlike the United State, where knowledge-based and factual recall education play a major role in medical education (Shumway & Harden, 2003), a critical examination of practice embracing learning outcomes is emphasised in the UK.

Outcome-based education and curriculum mapping are key approaches used in Scotland to identify consensus learning outcomes and essential components for undergraduate medical education. These are mapped to the standards published by the General Medical Council (GMC) (Scottish Deans' Medical Education Group, 2008). The Scottish medical schools had a series of meetings to respond to the recommendations through the set-up of the Scottish Deans' Medical Education Groups (SDMEG) in 1999 (Scottish Deans' Medical Curriculum Group, 2000). The group conducted meetings to address issues related to the development, delivery, and evaluation of the undergraduate curriculum, with representatives from each school in attendance. These three main areas later were modified and prioritised by SDMEG and cross-referenced with 'the GMC' recommendations to meet the need of healthcare at that specific time which will be discussed later in this section. The SDMEG learning outcomes project aimed to establish a set of agreed-upon learning outcomes for Scottish medical schools (Scottish Deans' Medical Education Group, 2008). Twelve domains were outlined.

- Clinical skills
- Practical procedures
- Patient investigation
- Patient management
- Health promotion and disease prevention
- Communication
- Medical informatics
- Basic, social and clinical sciences and underlying principles
- Attitudes, ethical understanding and legal responsibilities

- Decision making skills and clinical reasoning and judgement
- The role of the doctor within the health service
- Personal development

When defining outcomes and system-based curricula, related tasks for clinical disciplines and body systems are also suggested (Harden, Crosby, Davis, Howie, & Struthers, 2000). The identified tasks serve as a guide for curriculum development, including the selection of appropriate teaching and assessment tools, which are then communicated to students through study guides (Shumway & Harden, 2003). Simulations and OSCE type sessions were selected as they are appropriate to improve learning and assess students at the master level of 'show how'(Davis, 2003) as described as the overarching learning (Bokken et al., 2009; General Medical Council, 2003).

The outcome/task-based teaching enables students to connect theoretical knowledge with practical application, prioritize essential issues, and facilitate more effective delivery of education. Simulation-based medical education (SBME) provides a safer environment for clinical teaching and allows for student-doctor feedback while simulating real-world clinical settings (Bokken et al., 2009). It can also be used to delegate tasks that are required by the undergraduate curriculum. The current trend highlights the importance of SBME application to ensure that practitioners are competent and reflective (Bokken et al., 2009; Scottish Deans' Medical Education Group, 2008).

When SBME first emerged it was closely aligned to policy makers' desire to 'highlight the importance of clinical skills learning' (Bradley & Postlethwaite, 2003, P. 7). This idea was presented as a new way of delivering teaching that moved the culture of medical education away from a traditional focus on bedside teaching to a model that engaged in simulated and reflective teaching. Areas for improvement were identified, which included identifying the users, enhancing teaching and learning, integrating within the curriculum, identifying necessary skills, staffing, facilitating learning with simulated patients, and allocating resources. These were all designed to move away from the traditional medical education teaching and the belief that the tutor knows best. To implement these changes, the medical schools need to adopt new

ways of teaching, acquire new skills and adopt new perspectives. Furthermore, Bradley and Postlethwaite (2003) argued for a focus on the needs of individuals who require certain skills to be trained. One way to achieve this is to promote a system that supports the development of SBME, supervision, and feedback in combination with opportunities for self-directed learning and practice. Furthermore, Ker (2003) argued for specific focus on the needs to early promote this integration and reflective approach in student's part of training.

In these early policy documents, recommendations and goals related to clinical skills were presented as follows: Students must have opportunities to develop and improve their clinical and practical skills in an integrated fashion, and they should do so in an appropriate environment before using these skills in clinical situations (General Medical Council, 2003; Hirsh et al., 2007). The role of clinical skills centre and the skills laboratories, which could provide an excellent setting for such training, also emerged in the concepts of SBME. The uses of simulation are later expressed explicitly in the Tomorrow's Doctor, stating that medical schools should take advantage of new technologies, including simulation, to deliver teaching. Opportunities should also be provided for students to learn with other health and social care students, including the use of simulated training environments with audio-visual recording and behavioural debriefing. This will help individual students understand many aspects of identified outcomes, including their roles and the importance of teamwork in providing care. Experiential learning in clinical settings, both real and simulated, is important to ensure graduates' preparedness for life-long learning (General Medical Council, 2009b).

Education strategies, referred to as the 'Student-centred, Problem-based, Integration, Community-based, Elective and Systematic (SPICES) continuum', seem to give Western medical school staff a better understanding of curricular strategies and communicate the conditions throughout the institution (Harden, Sowden, & Dunn, 1984). When the Scottish program was designed, it was with the goal of ensuring that all students become competent and reflective physicians, and their training covers the necessary experiences. The system-based approach was employed to provide the context for students to achieve as the learning outcomes progressed. The course design demonstrates what students must see and do with core clinical

problems, and it also highlights how simulation-based learning is used as a vehicle for integrating knowledge and promoting problem-solving skills. Integrated teaching uses elements of both horizontal and vertical integration and focuses on the organization of teaching to interrelate or unify subjects taught in separate academic courses or departments (General Medical Council, 2015a). Lectures and demonstrations in each organ system are then designed, taught and given by the involved educators from different specialities which will be discussed later in this chapter. This sophisticated blend of educational strategies hence requires proper assessment, including OSCEs.

The medical curriculum approach is based more on the philosophy that 'a curriculum should be viewed not simply as an aggregate of separate subjects but rather as a programme of study where the whole is greater than the sum of the parts' (Harden, Davis, & Crosby, 1997, P. 264). This approach was later adopted and recommended as a spiral undergraduate curriculum which was seen as the first step in the continuum of medical education. In the curriculum, an iterative process of learning needs to be combined with repeated practice to develop individual skill, anticipating the range and complexity of skills learning to increase as learners move along the continuum of the medical education (Harden, 1999). Harden argued that for the students to achieve the required outcomes or standards, they must be assessed for competence that progressively moves from simple to complex upon completion of each year. (Harden, 1999). OSCEs were applied in terms of simulation-based medical education to use for formative and summative assessment purposes and for providing feedback to students and staff (Davis, 2003). The simulation embedded was used not only for providing realistic and safe learning environments, but also used in combination to create an integrated clinical educational model appropriate to use across the entire ‘continuous curriculum’ (Ker, 2003). Reflections used in the SBME are central to the foundation for life-long learning and continuing professional development (General Medical Council, 2015a).

To effectively use SBME, it is important to contextualize clinical skills within the curriculum. The reform of the UK curriculum has enabled schools to remap their curriculum (Bradley & Postlethwaite, 2003), providing a spiral nature of the curriculum, a system-based approach, and

an outcome-based curriculum that dictates what is taught and assessed. The key factor helping to improve communication about the curriculum and its learning outcomes is the system-based working groups, each comprising clinicians, basic scientists, and joint convenors (Harden et al., 1997). These working groups have identified the skills that can form a clinical skills program.

GMC presents SBME as a means of highlighting the importance of clinical skills learning and promoting integrated and continuous clinical learning for medical schools. In effect, it is a deficit model which sees medical students in medical school as deficient in clinical related skills as a result of healthcare landscape changes. The proposal is to change ways of delivering medical education, improve medical related skills and introduce new ways of integrating and assessing knowledge gained, leading to emergence of new medical education models and the creation of a more constructive and patient-centred education.

On the one hand, continuity of care allows students to have relevant, extended, and serial contact with patients, physician preceptors, and other healthcare professionals. On the other hand, continuity of curriculum provides space for self-reflective practice, conceptual integration, and critical thinking, which are essential for deep and meaningful learning. Without these elements, learning can become purely outcome-based and heuristic. Meaningful clinical experiences and continuity of identified outcomes support students' ability to gain experience in all they can about their patients and their conditions. Continuity of supervision also provides iterative dialogue grounded in practice about values, professionalism, and lifelong learning. It can be seen that ideas about the nature of knowledge and the ways in which students learn can have a significant impact on pedagogy, while the ideology and values about the nature and purpose of medical education can affect both the teachers' teaching approach and the design of the curriculum. As a result of being a collective type of knowledge, this serial and dialogical approach allows the tacit knowledge to be converted into explicit knowledge and build up a common and integrated practice (Fock, 2006).

Within the literature produced, various conceptual frameworks and techniques have been developed to assist with the task of understanding and exploiting knowledge to create organisation learning and optimise opportunities for change. These will be discussed in the

following section. However, to understand pedagogical consequences of the ideological views of curriculum planners and educators are directly influenced by underpinning assumptions which they hold about the nature and purpose of SBME. The following section outlines various arguments related to the interplay between epistemological assumptions and methodology in approaches to medical education, specifically SBME, and how this interplay is central to analysing the influence of the UG medical curriculum. This is because epistemological assumptions about medical education have a direct impact on teaching methodology, and understanding this relationship is crucial in assessing the curriculum's impact on SBME.

2.5.2 Micro-environment Impacts

Similar to earlier work on UG medicine and more recent studies on learning outcomes, it is widely accepted that SBME incorporates the outcome construction and evaluation of specific outcomes to distinguish it from other teaching methods. The fundamental reason for this from the tutor's perspective is to encourage learners to participate in SBME sessions and compare their outcomes obtained through SBME to those obtained through conventional teaching. (Harden, 2007). Table 2.4 shows how learning is constructed using different teaching tools in different learning environments. The table suggests that the traditional teaching process involves face-to-face transfer of declarative information/knowledge to learners, while web-based lectures are seen as a supplement rather than a replacement for face-to-face lectures. However, as shown in Table 2.4, these categories are not definitive, as outcomes can be created by utilising various tools and constructional design elements (Thai et al., 2019).

Table 2.4: Outcome Construction Employed using Different Approaches

Approach	Traditional	Flipped	Blended	Electronic
Material	Printed	Printed	Printed	Printed
Lecture	Face-to-face	Web-based	Face-to-face	Web-based
Interaction	Guiding questions tackled in (classroom) group activity	Guiding questions tackled in (classroom) group activity	Guiding questions tackled in (online) group activity	Guiding questions tackled in (online) group activity
Feedback	Immediate feedback in class	Immediate feedback in class	Delayed feedback (online)	Delayed feedback (online)

Source: Adapted from Thai et al. (2019)

The linkages between learning outcomes (tasks) and individual learning processes (persons) are aimed at highlighting the context and learning environment associated with specific scenarios, such as SBME, and to distinguish them from the perceived negative feedback associated with traditional medical education approaches (Dieckmann & Ringsted, 2013). Clinical skills learned in SBME often involve a combination of these components. In addition to each SBME clinical session, tutors establish these linkages by aligning the learning needs, aims, and objectives of the session and selecting an appropriate learning environment for delivering the session. This highlights not only the types of SBME, but also how constructing these linkages has an implicit element, captured by the integration of discourse around how these three factors interplay. This is an important point when it comes to constructing learning outcomes. This is because medical practices are associated with certain learner states and traits, places, and healthcare systems. These present SBME located therein with unique learning opportunities that enable differentiation. This form of difference cannot be transferred to other countries or be capitalised upon models that are situated in different trajectories. Developing these linkages is an important discourse for 'transformative innovation'. This is because through these various

associations, learners become more aware of their opportunity for their learning and the way it is produced (Dieckmann & Ringsted, 2013), reinforcing the value of figure 2.2 which suggests why SBME changes are needed.

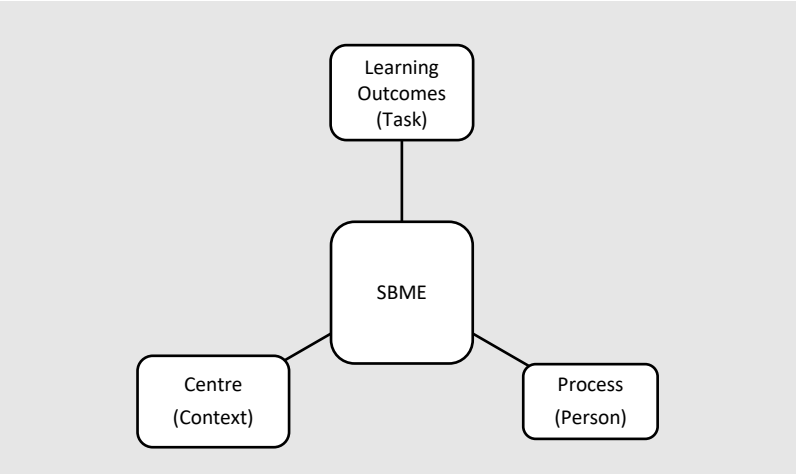


Figure 2.2: Constructing Learning Outcomes through Learning Outcome (Task), Process (Person) and Centre (Context)
Source: adapted from Dieckmann & Ringsted (2013)

These three related dimensions (Task, Person and Context (TPC)) and the conceptualisation of outcome construction and differentiation are more apparent. Moreover, the linkages between learning process and environment are more prevalent in Europe and North America. While this has enabled access to understand SBME and provided some SBME implementers with the means of outcome-based curriculum, recent scholarship is critical of the success of the implementation and the broader impact of curriculum (Nehring & Lashley, 2009; Rosen, 2008). This TPC applies to the wider realm of SBME implementation and provides a useful framework to investigate the educational strategies and potential of SBME in the context. Allied to this, it is important to explore how SBME, using outcome constructs, linked to notions of curriculum and whether this type of strategic model can help foster stronger connection.

This ideology is clearly closer to the philosophy of constructivism than those emphasising knowledge and this represents developmental traditions in primary education. If this justifies the constructivist approach to teaching and learning is timely appropriate, then those educational ideologies which emphasise permanence of knowledge are unsuitable (Littledyke,

1996). In this model, spontaneity and active discovery is celebrated, whilst knowledge is provisional, tentative, and pragmatic. Thus, 'progressive' ideology can be seen as a part of a strategy of social renewal. This view also assumes that discovering and following the developmental and social needs of medical students is more important than the traditional transmission of knowledge.

An epistemology that recognises knowledge as practical also leads to an understanding that SBME is more than a process of learning from deliberate practice. Thus, SBME is known as an experiential learning activity (Dieckmann & Ringsted, 2013). Furthermore, construction of medical knowledge takes place in social context and this influences the nature of that knowledge and the processes by which it was constructed. This view of SBME as a process of the learning from experiencing deliberate practice produces a pedagogy which develops SBME understanding through the designing learning opportunity by creating simulated environment, with the scenarios being as good as the real situation. SBME teaching thus emphasizes the construction of experience in the safety environment. The current model of SBME then generally conveys as,

- Learner efforts to experience the physical learning environment
- Producing knowledge which is subject to challenge by deliberative practice
- Building upon previous knowledge and understanding

This view of SBME is compatible with the ideologies underpinning the outcome-based curriculum in which medical students construct their experience through the processes of experiential learning around ‘continuity of care’ (Hirsh et al., 2007) and ‘public and patient involvement’ (Grant, 2013) ideologies in a similar way to which medics practice on their daily basis. Thus, the medics generate their skills which are repeated across many years of their experiences (Kneebone, 2009). In this process there is no one identical experience, only experiential models which can change in the light of different case and context. SBME is then seen as part of a process of a social construction of agreed tasks to be experienced.

These views of SBME, which are held by the constructivist model of learning, has been developed through extensive research into educator's alternative understanding of SBME concept. Constructivism views individuals as active constructors of experience (Dieckmann & Ringsted, 2013). Thus, students create their own understanding from particular experience and the resulting perceptions may or may not be similar to other individuals' perceptions. This may or may not fit accepted scientific teaching models. Information which conflicts with these personal constructs may create a change in the construct if it is shown to be meaningful, while it may be rejected or unnoticed if it does not make sense. Issenberg et al. (2005) showed how meaningful SBME related learning is important to the development of clinical skills. A constructivist view of learning obtained is based on the notion that (Cakir, 2008; Ollerenshaw & Ritchie, 1997):

- Learner's prior knowledge matters (Expectation and perception determine what information will be selected out for attention)
- The construction of meaning is a continuous and active process (Individuals construct their own matters from elements of information received)
- Learners have the final responsibility for their own (Some constructed meanings are shared or 'negotiated'.)
- Learning may involve conceptual change (The construction of meaning does not always lead to belief as it can be accepted or rejected)

Cakir (2008) recommended models for the creation of curricula on constructivist lines and this has been developed into models for teaching strategies as a series of phases which informs a constructivist approach of teaching. Ollerenshaw & Ritchie (1997) demonstrated their models for planning and developing teaching approach based on a constructivist view as the following steps:

- Orientation (Arousing learners' interest and curiosity)
- Structuring (Helping learners to find out and clarify what they think)
- Intervention (Encouraging learners to test their ideas: to extend, develop or replace them)

- Review (Helping learners to recognise the significance to what they have found out)
- Application (Helping learners to relate what they have learned to their everyday lives)

While continuity of education bonds students with relevant, extended, and serial contact with patients, simulation, tutors, and other health care professionals, continuity of curriculum bridges space for self-reflective practice, conceptual integration, and critical thinking, without which learning becomes task-based and heuristic. Meaningful clinical experiences and continuity of supervision support students' ability to know all they can about their patients and their conditions. Continuity of supervision also provides iterative dialogue grounded in practice about values, professionalism, and lifelong learning. It can be seen that idea concerning the nature of knowledge and the ways in which students learn impacts pedagogy, whilst ideology and values about the nature and purpose of medical education affect both teachers in their approach to teaching and design of the curriculum.

As the locus of control in this view is in the learner, the teacher is therefore acting as a facilitator of learning. It is important that the teacher recognises the learning value as one of a wide range of learning situations (Ollerenshaw & Ritchie, 1997). The teacher instruction designs and methods of application are free to use for stimulating learning and helping learners to understand socially agree forms of knowledge. In medicine, the analogy of a medical learner as a practising medic is one that has been proposed as a useful metaphor. However, the view of students as autonomous practitioners has limitations, as medical students acting by themselves clearly need to boost their knowledge and to be provided controlled and safe practice opportunities (Issenberg et al., 2005). The metaphor of 'novice practitioners' for medical student engaged in constructivist SBME programmes may be a more useful model. Thus, the pedagogy of SBME which acknowledges current understanding of learning processes and the nature of medical education should have a constructivist and process basis, theoretical and clinical practice knowledge being seen as tentative and open to challenge for the application in a safe environment.

2.5.3 COVID-19 and the Emergence of Distance Learning Approach

Changes in educational policy around the world as a result of the current pandemic are coupled with the increasing importance of social distancing, and changing perspective on, Distance Learning (DL) and Information and Communication Technology (ICT) (Ferrel & Ryan, 2020). The mismatches between institutional approaches and changes in a wider society tend to be concerned with how the educational system adapts itself to meet the new requirements (Young & Muller, 2010). Identifying what are the healthcare demands of during and after COVID-19 started and how to respond to these changes will unblind the educationalists and enthuse them to consider their possible futures. Standard didactic teaching to mimic these interactive discussions online will need to be considered in order to ensure that the future experience is adequate in preparing our students for clinical clerkships and beyond (Ferrel & Ryan, 2020).

During the COVID-19 pandemic, medical schools and universities increasingly turned to remote and blended learning solutions to help both educators and students (Arandjelovic et al., 2020; Edwards et al., 2020), however, educators faced difficulties when transforming and diffusing the approach as their role was changed accordingly (Redmond, 2011). Medical educators perform a significant role in medical education teaching and do so using various forms of teaching knowledge. Their practice is informed by ideology and epistemology underpinned, capture this tacit innovative knowledge and making it explicit to wider medial education communities as well as by making use of organisational data and information and resources available to them. This could provide educators with the knowledge they require to carry out the functions required. However, the challenge involved in understanding the issues and concerns related to teaching comes from the changing nature of undergraduate medicine approaches used and produced in the carrying out of this role during the COVID-19 pandemic.

This then leads to a discrepancy between what they say they used to do and what they changed later in practice, which then leads to innovations. Of these, the medical schools around the world share many characteristics and present some of the unique or distinctive features (Brice & Corrigan, 2010; Kennedy, 2013), the innovative and uniform criteria and standardisation hence are gradually developed (Custers & Cate, 2018). It is also the continuity as a result of

change, which creates new organisational knowledge and innovation. It is not only the healthcare expectations placed upon medical education that can cause problems; but the way in which medical education institutions manage quality assurances is also often as problematic as those the quality assurances was intended to maintain.

The increased use of distance learning has not only changed the way in which tutor teaching and student learning are supported, but also the way which teaching is provided to students (Mian & Khan, 2020). Arandjelovic et al. (2020) consider it is vital, during the pandemic, that the medical educators make greater use of the physical distancing activities, online-based teaching and telehealth services, in order to sustain relationships with learners. Looking at the integration of online-based teaching suggests students interact with online discussions more than in-person group meetings and interactions. Ferrel & Ryan (2020) argued that the goal of minimising personal interactions to mitigate and contain the spread of virus may be achieved, but students may miss out on their valuable experiences of face-to-face interactions, led to the question of how they will evolve and integrate themselves into the medical community. The authors asserted that this represents additional value as the delivery of a more physical distancing teaching was not widely available to learners since the nature of medicine suggests students interact with patients more than look at the screen, however the literatures are limited in that they were commentary and editorial.

While the use of online sessions is inevitably playing a greater role in the way universities communicate with their students, as a result of its ever-increasing prevalence during the disruption, it is unrealistic to expect all educators to embrace the idea of 'virtual' community in order to provide them with online guidance. Hollander & Carr (2020) described the potential of virtual innovations in disasters and public health emergencies. This manifests on itself in different learning formats between educators and learners, who expect almost instant access to resources. Educators tend to have come to technology later in life, whereas students have grown up with technology. As a result, educators have to understand both students' needs and their digital expectations and solutions. Pottle (2019) is clear that technology in SBME will become central to healthcare education, the virtual environment as a powerful educational tool

will facilitate quality clinical education at scale, social distancing and transform how we deliver future medical education. A wide range of digital solutions should be carefully considered and adapted to meet the changing needs as healthcare systems and education institutes are struggling with the pandemic.

One main reason many universities are moving to a more virtual approach is through the provision of social distancing activities which comply to national and local guidance. Mian & Khan (2020) highlighted the problems medical education institutions face when attempting to delivery teaching in the time of COVID-19 pandemic. They described the move from traditional forms of 'face-to-face' based teaching to other modes, in line with principles of physical distancing. These online platforms may be sufficient for pre-clinical years but not the seniors who are placed in clinical environment require human contact. Arandjelovic et al. (2020) asserted that a number have transitioned to online teaching to facilitate learning and, especially, timely graduation of medical students. They emphasised the fact that such a situation requires innovative teaching and assessment methods. What they fail to explain is how they can succeed in engaging with staff, designing remote teaching and delivering COVID-19 models. Nonetheless, the implementation of such pedagogy does provide the medical school with an opportunity to take stock of its pre COVID-19 policies and practices and identify where enhancements can be made.

Even given the increasing role of remote/distance learning, the use of such system should not come at the cost of a face-to-face interactions. Mian & Khan (2020) outlined the drastic reorganisation of medical teaching and training that needed to be done for medical students and trainees during the time of COVID-19. They argued that student-patient engagement is still necessary and online teaching does not substitute for patient contact as developing key clinical skills needs to be engaged with patients. They recommended the use of alternative medicine technologies to help students learn and prepare for their learning, it also places additional demands upon the system to support educators who are not prepared for these rapid changes. This call for alternative or blended learning underlines the difficulties faced by the medical

school, providing optimal and adequate range of solutions to meet the needs of both students and educators.

These issues have put the educators under pressure to re-examine their philosophy and their pedagogy. The understanding of transformation from direct face-to-face to a blended approach would allow the researcher to understand how the tutors constructed, deconstructed and reconstructed their philosophy and practice (Redmond, 2011). Redmond (2011) also added that this might affect professional identity and teaching practices as well as transformational shifts in their approach to teaching. This can also explain pedagogical journey and changes in: roles and responsibilities; use of materials; use of technology; relationship; presence and a perception over interactions. These can be seen in the manifestations and the deliveries of the course and reflected the values of the wider society in the table 2.5 below (Law, 2014).

The categories of teaching (pedagogical) presence mentioned might be seen through manifestations in the curriculum. The curriculum management including planning and structural decisions can be seen through the instructional design and organization. The teaching pedagogy can be enacted through the facilitating discourse used in the organization and can also be observed through the visible actions or verbal contributions that manifested throughout the course. Teaching presence is not only the indicators of the quality and quantity of the teaching, but also the overall learning experiences provided for the students.

In order to truly understand the potential benefits of distancing teaching in the provision of SBME, further research is required. This involves an examination of the issues raised by the transition to a more pedagogical solution, as attempts are made to innovate knowledge, leading to increased demands being placed upon educators. The solution of any issues experienced at the organisational level can only be achieved via social interaction within the organisation and with an understanding of demands and needs of students as well as society, especially healthcare services. By examining the SBME pedagogy and the processes involved in implementing SBME, a deeper understanding of how local contexts and COVID-19 has impacted upon SBME and how the medical school SBME knowledge can be used to help adapt and innovate SBME provision can be gained.

Table 2.5: Teaching (Pedagogical) Presence (Manifestation) Categories and Indicators

Categories	Manifestations
Instructional design and organisation	Setting the curriculum; Designing methods; Establishing time parameters; Utilising medium effectively; Establishing netiquette; and Making macro-level comments about content.
Facilitating discourse	Identifying area of agreement/disagreement; Seeking to reach consensus/understanding; Encouraging, acknowledging, or reinforcing student contributions; Setting the climate for learning; Drawing in participants, and promoting discussion; and Assessing the efficacy of the process.
Direct instruction	Presenting content/questions; Focusing the discussion on specific issues; Summarizing the discussion; Confirming understanding through assessment and explanatory feedback; Diagnosing misconception; Injecting knowledge from diverse sources; and Responding to technical concerns.

Source: modified from Garrison, Anderson and Archer (2000)

2.6 Blended Medical Education

The changing nature of social conditions during the pandemic, with its social distancing related issues, has required academics to change their approaches to combine or replace with a distance teaching component to both develop learning outcomes and also maximise medical education going forward (Arandjelovic et al., 2020). Although the use of two or more distinct methods of training or distance learning has actually become known and been delivered via educational institutes for decades (Cox et al., 2003; Sharma, 2011), the literature is inconsistent in describing distance learning largely because it has been enacted and known in practice in a

variety of ways, for instance, web-based learning, flexible learning, mixed mode or hybrid delivery (McKimm et al., 2003; Redmond, 2011).

2.6.1 Defining Blended Education

Distance education is growing, learner-centred paradigm for future learning and almost every university and college are involved in some type of distance education (Moore and Kearsley, 1996). Distance learning and distance education are used interchangeably. When distance is where the teacher and the student are separated by space and/or time (Miller & King, 2003), there are two general criteria for judging the type of distance, geographical location and time that are divided into four subcategories: 'same-time, same-place (ST-SP); different-time, same-place (DT-SP); same-time, different-place (ST-DP); and different-time, different-place (DT-DP)'. The face-to-face component remains either DT-SP or ST-SP and the distance education component remains either DT-DP or ST-DP (Miller & King, 2003). The more recent innovations found in a number of traditional face-to-face approaches (ST-SP) is the inclusion of both distance (online) synchronous and asynchronous components in the class. These four categories are defined below by Miller & King (2003):

- Same time, same place – This is traditional face-to-face approach where both the instructor and learners are in the same classroom.
- Different time, same place – Participants in the learning and teaching process interact in the same space but at the time they choose such as the courses that have more than one section, but those sections meet in the same classroom or asynchronous online discussions.
- Same time, different place – The learners are present at the same time as the instructor but are in different geographical locations, they are out of synchrony with each other only in physical space. This is commonly known as synchronous distance learning/education.
- Different time, different place -- This is commonly known as asynchronous distance learning/education such as the use of e-mail.

The different perspectives in Table 2.6 indicate that distance learning and teaching does bring with it a change to the nature of teaching and this drives the need for a pedagogical shift (Miller & King, 2003).

There are different points of view on the learner, educator, pedagogy and the organisation. The distance education has significantly changed the social element of education to a more prominent position as the online social presence of all participants and their interaction. The social element of education, particularly the learners, is critical to its success. This explains why there is a need for a distance education component to be more virtually constructive, collaborative and student-centred (Miller & King, 2003; Redmond, 2011). The difficulty for this transformation was seen to be able to promote through a collaborative virtual community approach. Hence, the most often-used pedagogical approach employed in successful distance education involves the establishment of a virtual community of leaners and the technical and software supports required (Miller & King, 2003; Rolls et al., 2019).

From the table, the move from face-to-face to blended and online teaching is quite confronting as it changes the nature of teaching, roles and workloads. Academics who have commonly taught in a face-to-face environment are under pressure to work in combined modes. In some cases it could result in a resistance towards online teaching (McQuiggan, 2007). One of the main reasons is that the transition to new ways of teaching and learning from traditional pre-COVID, face-to-face approaches challenges the expectation and roles of instructors, learners, and the courses. In the time of the COVID-19 pandemic, the tutors know that they have to redefine themselves in the light of the change in the educational landscape which may lead to a wide range of methods used to meet learning needs (Cronje, 2021).

Table 2.6: Characteristics of Face-to-face and Distance Education

	Face-to-face education		Distance education	
	ST-SP	DT-SP	ST-DP	DT-DP
The learner	Traditional learners Ones who can attend courses on campus Passive learners Learners are with their peers in their learning environment Timely instructor feedback needed		Non-traditional learners Working adults and other who cannot attend course on campus Active learners (more self-disciplined, self-regulated and self-directed as seeking further education) Learners may be alone in their learning environment Timely instructor feedback needed (asynchronous distance education)	
The educator	Traditional taught class		Technology-based taught class Lack of technological expertise is another major barrier Increased time demands Create a sense of online community and promote interaction and collaborative learning	
The pedagogy	Learning takes place when learners interact with the instructor, each other or active learning sources Instructive, non-collaborative and teacher-centred		Lack of human contact and feeling of isolation (personal touch doesn't exist) may affect learning. Constructive, collaborative and student-centred through the concept of social presence (a sense of virtual community)	
The organization	Physical spaces		Basic faculty and student educational technology training is the key to success Online classrooms Synchronous distance education is more expensive than asynchronous.	

Source: modified from Miller & King (2003)

There is clearly a range of difference about how and why tutors and students engage with SBME, but in order for them to be viable outcome-based education strategies they need to be able to differentiate teaching and learning various sessions in order to understand the SBME. This is especially applicable to blended SBME where there is limited access to face-to-face teaching, the progression of students to the exit learning outcomes will be lacking or tenuous when compared to direct face-to-face interactions. Therefore, the ability to access face-to-face settings and differentiate upstream is important to ensure that 'value-laden' skills are communicated and transferred further downstream. Indeed, communicating bespoke outcome-based curriculum strategies to stakeholders who may be situated in and beyond the courses, or who may have little or no knowledge about the process of SBME, is essential if the other stakeholders are to benefits from innovative SBME.

2.6.2 From Conventional SBME to Blended SBME (Pedagogical Implications)

The views of SBME are held by the constructivist model of learning which has been developed through extensive research into educator's alternative understanding of SBME concept. Constructivism views individuals as active constructors of experience (Dieckmann & Ringsted, 2013). Thus, students create their own understanding from particular experiences and the resulting perceptions may or may not be similar to other individuals' perceptions. This may or may not fit accepted distance teaching models. Information which conflicts with these pandemic constructs may create a change in the construct if it is shown to be meaningful, while it may be rejected or unnoticed if it does not make sense.

As such, the presence of 'outcome-based education' embeddedness is a critical factor for UG tutors engaged in SBME if they are to succeed in capturing and retaining SBME value. Successful communicating 'embedded epistemology' is clearly of worth as it offers the potential to forge medical education tools' role founded upon a more education a set of values and standards that tutors are increasingly finding desirable. This is what Dornan (2005, P. 94) refers to as 'an experience of illness' rather than a 'rich casemix' approach; experience is not the only determining factor as there are other social and education values, such as communication skills, for example, that come into the non-technical skills used in practice.

Schofield et al. (2017) provided another layer to these initial SBME categories introduced by Cook et al. (2011) by adding that central to all SBME are face-to-face relations. Schofield et al. (2017) argued that the 'most effective' types of SBME occur where there are direct interactions between tutors and students, which by definition will also be physically close owing to the face-to-face contact at the point of interaction. This echoes the work of Norman (2012), who found that medical education gave rise to an 'outcome-based education', arguing that tutors and students are often motivated by, and feel the benefit from the interactions that occur during the direct experience of simulated scenarios.

The current outcome-based education curriculum seen '…is not simply the repetition of a topic taught. It requires also the deepening of it, with each successive encounter building on the previous one' (Harden, 1999). This progressive and learner-centred ideology emphasises the individual learner and is a conception of a learner's unfolding nature, their interests and their developmental needs, which is essentially a constructivist pedagogy (Harden, 1999). The process of learning is of prime significance and empiricism, subjectivity, the development of personal meaning, practical activity and problem solving are the modes of learning.

This ideology is clearly closer to the philosophy of constructivism than those emphasising knowledge and it represents a developmental tradition in education. If this justifies the constructivist approach to teaching and learning that is time appropriate, then those educational ideologies which emphasise permanence of knowledge are unfitting (Littledyke, 1996). In this model spontaneity and active discovery is celebrated, whilst knowledge is provisional, tentative, and pragmatic. Thus, 'progressive' ideology can be seen as a part of a strategy of social renewal. This view also assumes that discovering and following the developmental and social needs of medical students is more important than the traditional transmission of knowledge.

The three related dimensions (TPC) of SBME pedagogy and the conceptualization of outcome construction and differentiation are more vulnerable and linkages between learning process and environment more defenseless globally. These have prevented SBME to be fully implemented and critical for the success of implementation. Allied to this, it is important to

explore how innovative SBME using outcome constructs is linked to notions of curriculum and whether this type of strategic model can help foster stronger connection during the pandemic.

To contribute further understanding to these issues, this study will use frameworks and methods associated with organisation change and knowledge to better understand how SBME is implemented and transformed. It will look at the experience of two medical schools and using a case study approach to reveal the available data which provides a deeper comprehension of the issues studied. This analysis will help to contribute to the body of knowledge related to SBME pedagogy and the role of organisation supports in facilitating knowledge production. In the next chapters I will further describe the techniques and frameworks employed and the reasons for their use.

2.7 Understanding Implementation and Innovative Transformation

SBME is more than a process of learning from deliberate practice. It is also an experiential learning activity (Dieckmann & Ringsted, 2013). When construction of medical knowledge takes place in a social context, this influences the nature of that knowledge and the processes by which it was constructed. This view has been normalised and supported by a number of authors (Hashim et al., 2016; Jones et al., 2015; McGlynn et al., 2012). To understand how the SBME implementation and innovation can become normalized, the following section will explore and explain the constructs for understanding the implementation and normalisation of new intervention in a particular context.

2.7.1 Normalisation Process Theory (NPT) Framework

NPT was used as a tool to understand and frame the implementation by learning from how the implementation processes were organised and presenting patterns and interactions within a specific context (Nilsen, 2015). Unlike other theories (see Figure 2.3), the NPT helps understand what people actually do and why some of their processes seem to lead to a practice become normalised while others do not (May et al., 2009). The factors that benefit and facilitate the embedding of SBME will be explained in its social contexts through the dynamic, contingent, and continuous four generative mechanisms.

The transformation of knowledge also requires the understanding of the non-linear interaction between the existing organisational structure and its environment in order to form a new social institute through the stages of implementation (Botma & Labuschagne, 2017; Kotter, 1995; Kotter & Schlesinger, 2008; Novotná et al., 2012). The initial review of the literature highlights multiple factors that can influence institutions implementing new programmes including local physical, socioeconomic and cultural contexts (Murray et al., 2010; World Health Organization, 2014). Contextual factors make a significant contribution to the implementation of the intervention (World Health Organization, 2014). Factors related to SBME identified in the literature include medical educational assets, the time consuming planning required and the perceived value of the simulation (Wright et al., 2006; Zendejas et al., 2011). Without careful management, these can be obstacles to the implementation to become normalised (Murray et al., 2010).

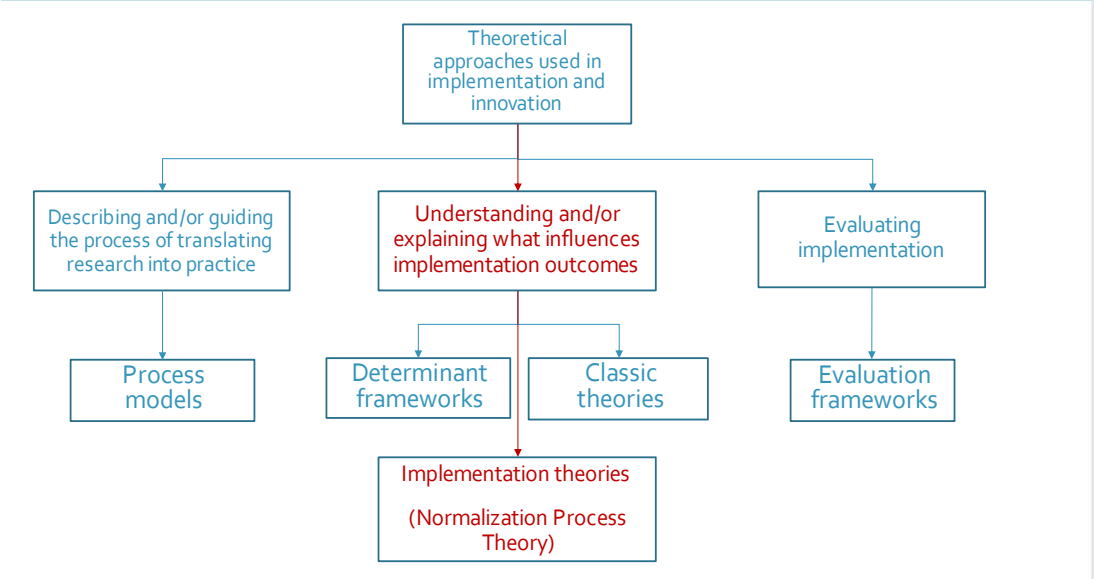


Figure 2.3: The Aim of the Use of Implementation Theories to Understand the Implementation of New Teaching Tool
Source: adapted from Nilsen **(**2015)

The exploration of the implementation process hence needs a more interpretative approach and contextual examination (Bassey, 1999). Implementing new intervention is a highly complex socialisation process (May & Finch, 2009). The implementation of new interventions to fit with

the organization involves all activities occurring from making an adoption to the time that the intervention becomes part of its routine practice. In order to translate this fit-for-purpose intervention, one needs to understand how it becomes routinely embedded and integrated into its existing context as a matter of more than a technology used which worked well elsewhere. Apart from the intervention, what matters most for the implementation is the complexity of the processes and the organization values where it is believed that most of the barriers for change stem from (Wood, 2017). Investigating driving forces, internal and external, and complexities of processes allows a clearer understanding of its values and a unified set of views and processes, in the setting. Table 2.7 below demonstrates the questions used to identify factors, guide the analysis and understand the implementation and explain the success or failure of the implementation under the four constructs of NPT.

Clearly, the change process is highly complex and undeniably for all organisations to face. The driving forces behind organisations need to understand the stability within organisation and be prepared to respond to the unintended consequences of actions and discrepancies during the translation processes. The drivers for change come from both the influences from outside and the organisation's own reactions to those external factors along with the influence they in turn use over their environment (Thompson et al., 2008). The discrepancy can occur the diverse organizational objectives lead to misunderstanding between what they say they do and what they actually do in practice.

Table 2.7: Normalisation Process Theory and their Four Constructs Modified to Understand SBME Implementation

NPT constructs and subconstructs as applied to SBME approach				
Construct	Coherence	Cognitive participation	Collective action	Reflexive monitoring
Sub-construct 1	Differentiation: Do the stakeholders see SBME as a new way of working?	Initiation: Are they willing and able to engage others in the implementation?	Skill set workability: Do those implementing the SBME have the correct skills and training for the job?	Reconfiguration: Will stakeholders be able to modify the SBME based on evaluation and experience?
Sub-construct 2	Individual specification: Do individuals understand what they require to do?	Activation: Can stakeholders identify what activities are required to sustain the SBME?	Contextual integration: Do local and national resources and policies support the implementation?	Communal appraisal: How will stakeholders collectively judge the effectiveness of the SBME?
Sub-construct 3	Communal specification: Do all those involved agree about the purpose of SBME?	Enrolment: Do the stakeholders believe they are the correct people to drive forward the implementation?	Interactional workability: Does the SBME make it easier or harder to complete tasks?	Individual appraisal: How will individuals judge the effectiveness of the SBME?
Sub-construct 4	Internalisation: Do all the stakeholders grasp the potential benefits and value of the SBME?	Legitimation: Do they believe it is appropriate for them to be involved in the intervention?	Relational integration: Do those involved in the implementation have confidence in the SBME?	Systematisation: Will stakeholders be able to judge the effectiveness of the SBME?

Source: adapted from O'Donnell et al. (2017)

The change process can be streamlined through a range of steering systems promoting the implementation such as the creation of guidelines, regulations and laws and the formation of a special working groups or units and then develop to greater extend with or without external supports (World Health Organization, 2013). It is important to consider issues regarding both knowledge and practice and bridge them through the 'steering mechanism' and the 'media' which vary from system to system in order to diffuse the translated knowledge in order to increase cognitive participation as well as collective action (Broadbent et al., 2010; Murray et al., 2010). The mechanism used by the steering media depends highly on what elements in the institute are taken for granted or valued (McKimm & Jones, 2018; Prideaux, 1993). The implementation may be challenged by the complexity of societal and contextual barriers (Bleakley et al., 2011; Murray et al., 2010; Rao, 2006).

The complexity often makes the process of change difficult to understand. However, the development of NPT and its four generative mechanisms mentioned (coherence, cognitive participation, collective action and reflective monitoring) have made a significant change on how to address and understand the implementation in a particular setting (May et al., 2009). This study examines both tacit (informal and hidden curriculum) and explicit (formal curriculum) knowledge on how the common cognitive ground is produced with a better understanding of how SBME was communicated and adopted in different medical schools as well as at different timeframes.

Coherence (Making Sense of Change and Innovation)

When a new practice is introduced, the institution needs to start with communicating the new knowledge and creating a new common cognitive ground (Holden & Von Kortzfleisch, 2004). Although new knowledge or practice begins with the individual, it is important that this personal initiation is transformed into team and later organisation knowledge (Nonaka, 2007). This knowledge translation activity creates common cognitive ground as well as converting tacit knowledge into explicit knowledge (Holden & Von Kortzfleisch, 2004). However, without understanding the embedded complexities and organization culture, the knowledge translation and creation could be misinterpreted and be difficult to link up with the rest of the team.

A transformational change in curriculum unquestionably requires academic leadership with clear vision and strategic planning as well as careful analysis of the current curriculum (McKimm & Jones, 2018). The recognition of priorities and plans based on institutional values and goals has created enablers to effective diffusion of key concepts in the conversed issue (Hodge et al., 2008). The institution and administrative supports including collaborative leadership also empower all key involved stakeholders in the adoption and the integration of the innovation (McKimm & Jones, 2018). The literature stresses that with adequate infrastructure supports including both low and high-cost simulators and technology in relation to simulators can equally provide learning experience to the learners (Hodge et al., 2008; Norman et al., 2012). The variety of SBME formats and a large number of cases experiences enable the adopters to be able to create learning environment to support the leaners to apply their knowledge into various realistic setting (Norman, 2012; Weller, 2004).

Another frequently cited reason for the adoption and integration of educational technology is having specialized and on-going technical support (McKimm & Jones, 2018; Nicklin, 2016). Training faculties (content experts) in both use of technology and understanding how to integrate the technology into the curriculum has impacted on the adoption and integration (Koehler et al., 2014). Koehler et al. (2014) suggested that content, pedagogical and technological knowledge should be crafted systematically in an integrated manner to support and develop early adopters of technology. Having collaborative role models or technology champions may also enable the rapid diffusion of the innovation (Covington et al., 2005; Gay & Kirkland, 2003). Additionally, the level of cognitive participation will increase as far as the community of practice gets support from their support networks (Wood, 2017). The institutions should, therefore, provide timely faculty development and tailor collaborative training to meet the needs of different adopter group (Birch & Burnett, 2009; Gay & Kirkland, 2003).

(Increasing) Cognitive Participation

Collective programme of the mind, so called ‘culture’ has an influence on how people in particular environment think and behave collectively (Hofstede et al., 2010). The sources of collective mental programmes underpin the way that each particular group is taught, trained

and experienced. This is explaining why some of the medical staff pay more or less attention to educational programmes established as not all clinical areas and disciplines are exposed to similar styles of training (Beuzekom et al., 2013). The effects of culture also demonstrate at cross cultural level where the same educational experiences are received and perceived differently (Williams et al., 2016). Understanding how this particular organisational culture and leadership affect the engagement and implementation should inform and enable us to design more effective implementation strategies for various educational settings.

The formal or intended plan is set to enable the implementation to take action, but the main change agents in the education seem to be the participation of educators involved (Bland et al., 2000; Mennin & Kaufman, 1989). However, medical schools contain various disciplinary groups who have different characteristics and territories that often lead to conflict of interest in the curriculum (Becher and Trowler cited in McKimm & Jones, 2018). This also depends on personal characteristics of the adopters (Jacobsen, 2000). A smooth transition of the educational intervention then requires a partial road map to support these mechanisms in order to gain more collective participations as well as actions, not the barriers to change (Gay & Kirkland, 2003; Gordon et al., 2000; Mennin & Kaufman, 1989). To gain their cognitive participation the implementer must align the strategic planning to the collective values (Jacobsen, 2000; Mennin & Kaufman, 1989; Murray et al., 2010).

Once the new common cognitive ground is created, in order to sustain the implementation, it is crucial to build a community of practice and enroll related actors (Wood, 2017). Literature says that having the community of practice or team created would allow the participants to interact as part of it and engage with the constant dialogue and communication. The dialogue and interaction will pool their contributions and eventually create a new collective perspective bridging multiple aspects in the organisation (May & Finch, 2009; Nonaka, 2007; Wood, 2017). This collective process itself leads to an increased level of cognitive participation and legitimation of the implementation. Within the community of practice created, the actors enrolled will possess powers of the intervention and legitimacy to exercise them. However, this depends highly on the commitment made by individual actors.

The major inhibitor to engage with the new activities seems to have association with the perception of ambiguity and interference such as increased academic confusion and workloads (Holden & Von Kortzfleisch, 2004; Moser, 2007). The implementation will have succeeded when the implementer recognises these issues and is able to convert the new intervention into a formal form and use it to extend individual tacit knowledge and embody it in a new innovation (Nonaka, 2007). Koehler et al. (2014) unpacked the issue of lack of time and found that deterring the prioritization of time by taking the opportunity to research and publish in the field of educational technology may be more beneficial. The institution needs to find those early adopters who can embrace a change, more intrinsically motivated to influence the majority and grow a critical mass of supporters in the community of practice (Jeffcott, 2014).

Cognitive participation is not the end expectations which are placed upon the individual in the community of practice. Once the new intervention has been understood and reinvented itself in the organization and the participants have agreed to implement the intervention, they are enrolled to take action by following the chain of interactions created. The actions might be reshaped as the intervention is reinvented to suit the context, but focusing on the goal raised by the community (May & Finch, 2009). The new intervention also requires to have interactional workability to ensure that this intervention is workable in practice and contextual integration to incorporate into the existing organisation pedagogical framework. With the understanding of epistemic cognition (Eastwood et al., 2017), the pedagogical dialogue can be used to better the understanding of the pedagogical difference and the use of technology (Friel et al., 2009). The simulation can be designed and used to support the academics' dialogue to move outside their preunderstanding and develop shared pedagogical conceptions (Kneebone, 2009).

Pedagogical Concerns (Lack of Equivalence) and Collective Actions

The main support to redesign a particular intervention comes from educators who control what, when, where, how and in what format students are to be taught (Gordon et al., 2000). The mechanism used to support these educators can be seen through the formal, informal and hidden curriculum in the redesigned intervention (McKimm & Jones, 2018). This type of explicit

and tangible manifestation is not only representing the product of the curriculum development but also demonstrates the educational pedagogy underpinning it (Adamson & Morris, 2014). The other aspects of curriculum, which can be observed through enacted and experienced curriculum, can also demonstrate how ideologies and cultural contexts influence the redesign and the implementation of the intervention being delivered.

Translating or redesigning interventions to suit local needs is an enormous challenge faced by the organisation that has been described as hierarchical, competitive and not minority friendly such as medical schools (Krupat et al., 2013). The champion organisation has many facets that support their effective implementation of change including organisational structure, leadership, organisational culture and resources (Krupat et al., 2013; Morrison et al., 2012; Wynford-Thomas et al., 2012). The traditional organisation model, which was designed for departments to be responsible for major clinical specialties as well as research, has been transformed into a more research theme based and centralised with teaching/medical education department to promote coordination of delivery of the undergraduate curriculum (Wynford-Thomas et al., 2012). But, the uniqueness of the medical school culture reflecting hierarchy and competitiveness can create barriers for collaboration (Krupat et al., 2013). The leadership role needs to, therefore, be able to provide support reflecting the priority given to change (Leigh-Hunt et al., 2015) and take collaborative expectations of the subordinates, otherwise the ideas mentioned that are unfit for their values may fall back into their old routine (Hofstede et al., 2010).

There is a range of pedagogical benefits for the development of SBME learning environment in relation to the persons (learners), tasks (SBME) and the context (Learning environment) involved (Dieckmann & Ringsted, 2013). There are epistemic practices and pedagogical motivations can be demonstrated in many aspects such as when breaking clinical related tasks into smaller parts, acknowledging different perceptions and facilitating an understandings of the tasks during debriefing (Barnesa et al., 2020). While the academics who have technological related to pedagogical content knowledge are able to identify potential positive impact on learning and integrate technology in the curriculum (Koehler et al., 2014), some academics may

struggle at the loss of benefits of the old learning approaches (Hodge et al., 2008; Kneebone, 2009; McKimm & Jones, 2018).

Reflexive Monitoring (Contextual Consciousness) and Change

The previous mentioned activities, workability and integration, are subject to continuous review and reflection and can be changed as results may differ from goals during the processes. The attention to formality and intensity of the reflexive monitoring demonstrate the commitment made from individuals and organisation (May & Finch, 2009). What can be seen from these reflexive monitoring activities is not only the formal and normative elements, the interchanging patterns from explicit to tacit dialogue when recognised is also a sign of the internalising of a particular practice (Nonaka, 2007). Deep understanding of the reflexive monitoring activities would allow to see the patterns of individual and communal appraisal explaining how the localities reframe their tacit knowledge and take the new intervention for granted to do the job.

Self-reflection, contextual critical consciousness and communication are imperative to improving the educational translation (Bland et al., 2000). They involve thoroughly analyzing and carefully monitoring both personal belief about the value of contextual diversity, and the best way to apply in contextually different medical schools for maximum positive effects. Corresponding perceptions and actions have to be changed to incorporate new knowledge and perception of contextual diversity. An innovative climate must be created to engage in these continuous critiques and efforts to make participants feel more relevant to diverse undergraduate territories and cultures as well as feel free to try out new interventions without fear of failure (Bland et al., 2000)

2.7.2 Connecting NPT with Transformative Innovation

There are many ways of implementing change mostly related to planned changes (Mitchell, 2013). Changes are vital to progress, but the complexities associated with implementation process and attempts at change often fail due to disruption occurred during the course of action. It is important that the researcher identify an appropriate change theory to provide a

framework for understanding change. Change theories are normally used to address how and why changes occur and what are the attributes of change agents. For example, Lewin (1951), the pioneer, identified three stages through which change agents must proceed before change becomes part of a system: unfreezing (when change is needed), moving (when change is initiated), and refreezing (when equilibrium is established). Roger expanded Lewin's into five phases of planned changed (awareness, interest, evaluation, trial and adoption). While these theorists focused on the change agents, the following Leicester's transformative innovation provides a framework for understanding the process of social change as describing three patterns of activity and how their interactions play out over time. The framework draws attention towards systemic patterns rather than individual events (see Table 2.8). These patterns result from the activity and behaviour of those who are maintaining or creating them in the present.

Table 2.8: Comparison of Change Theories

Authors	Lewin	Rogers	Leicester
Stage 1	Unfreezing	Awareness	Dominant systems' causes of concerns
Stage 2	Moving	Interest Evaluation Trial	Promising transition activities and innovations
Stage 3	Refreshing	Adoption	Emerging aspirations for the future

Source: adapted from Leicester (2016) and Mitchell (2013)

The three Horizons (Figure 2.4) provides a framework for understanding the complex process of social change (Leicester, 2016). Three educational scenarios provide an understanding of possible futures social scenarios (Young & Muller, 2010). Together, these two concepts i.e., NPT and three horizons, provide a framework for understanding change processes. The following section will explain these three horizons.

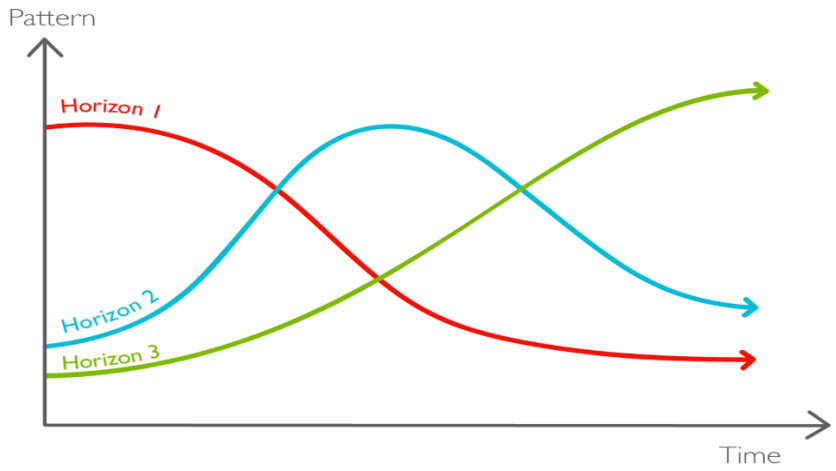


Figure 2.4: Three Horizons of Transformative Innovation (Leicester, 2016)

The first horizon describes the dominant system in place where the boundaries are given and fixed. There is no-socialised concept of knowledge (Leicester, 2016). Leicester (2016) claimed that this first horizon model represents 'transmission of knowledge' role as boundedness for dominant systems to maintain its stability and reliability by itself. This represents attempts of the 'dominant knowledge traditions' to continue the 'business as usual.' Non-integrated, departmentalisation or face-to-face teaching are among the most obvious examples in many medical education systems. This is similar to the pre-COVID or H1 scenario that presents attempts to continue many curricular formed and shaped by the established educational systems (Young & Muller, 2010).

The second horizon is a pattern of transition activities and innovations in response to the changing landscape (Leicester, 2016). This is a progressive opposition of H1. This H2 phase envisages a steady weakening of the boundaries and demonstrates a moving border between previous dominant system and new system. This model bases on the assumption that specific kinds of social conditions in the emerging global context, under which powerful knowledge is acquired and produced, affect the creation of new knowledge. The innovations can be either 'sustaining' or 'disruptive' depending on how they affect the system. In the case of the pandemic, the blended learning approach to SBME may have gained recognition as an effective way of teaching. Over time, some of these innovations will be absorbed into the dominant

systems. Some of these would pave the way to the emergence of new normals in the subsequent horizon (Young & Muller, 2010).

The third horizon (H3) is the end of the dominant boundaries (over-socialised concept of knowledge) where co-creation of knowledge occurs (Leicester, 2016). This domain-specific approach has a basis for the acquisition and production of new knowledge and human development. This borderless trend, coupled with the deeper understanding of the situation and changing needs, eventually emerges as the new transformative pattern.

In the following section (see Figure 2.5), the topics discussed and actions agreed are conceptualised according to the NPT and placed into the transformative innovation model. As discussed, these three horizons of change as conceptualised by Leicester (2016) strongly resonate with May & Finch's (2009) understanding of SBME implementation before and between 'disruptive' UG medicine. They argued that implementation occurs in both the healthcare and medical education context as well as at the local medical school level. The innovation occurs through the linkages between different healthcare and medical education systems. This is a key point because it is impossible to understand the implementation process without considering the local context that roots it in place (O'Donnell et al., 2017).

Figure 2.5, the three-horizon framework demonstrates changes through the disruption and the NPT reveals the factors and the nature of relations among those involved in SBME implementation within the different timeframes. The relationships associated with linking medical education can be seen as an important component in the implementation and innovation of SBME within the broader UG medicine context in which they are situated, connecting different disciplines to one another. Linking medical education factors is what provides supports for knowledge translation and diffusion that are necessary for gaining collaborative participation and action. Bridging medical education factors involves relationships in the organization and so this type creates the connections across disciplines and networks. However, as yet connection between these layers of medical education and SBME implementation has yet to be directly made or explored.

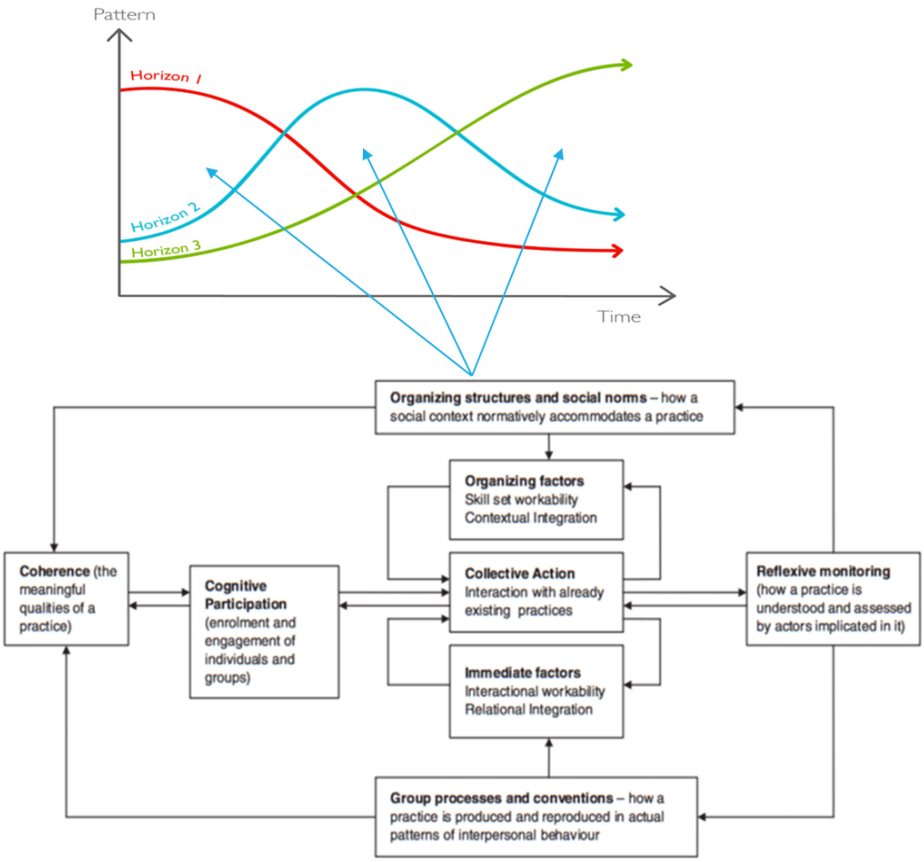


Figure 2.5: Transformative innovation (Leicester, 2016) and Implementation and normalisation factors of the NPT (Christiaan Vis et al., 2019)

There is a growing sense nationally that the current model may not be aligned to disruption at the present and the future 'new normal' health care needs (Ferrel & Ryan, 2020). Medical education is facing many challenges as COVID-19 disrupts the routine learning opportunities with significant ongoing pandemic reduction measures. As healthcare and medical education needs to evolve, many medical schools including SBME teams are reviewing the pedagogy they use to support their education visions. TI, hence, could be used to explore the emerging model of medical education in medical schools which has recently been changed to a considerable extent as the primary goal of UG education has changed in order to produce students who are broadly skilled in the core competencies that transcend all disciplines of medicine in a socially isolated environment (Mian & Khan, 2020). The challenge is how to accomplish this goal in a clinical learning environment which is even more separated by the impact of COVID-19. One

would incorporate the strengths of the integration and remote/technology enhanced medical educational model but eliminate the model's major weakness – a face-to-face interaction among different learning experiences may have to be substituted with teleteaching technologies (Mian & Khan, 2020). The following section will explain the brief relationship between the changes of medical education landscape and current pedagogies used.

Nationally and internationally, the future remained deeply uncertain when the research started. What does this mean for the future of SBME and UG medicine? What the challenges and the opportunities was this virus created and what has this forced change presented? The increased focus on the knowledge translation and the frameworks of innovation has been accompanied by growing interest in concepts related to NPT (May et al., 2009) and TI (Leicester, 2016) to facilitate such transformation. Change is somewhat foreseeable, and the areas and direction of innovation need to be managed in order to achieve and maintain organisation goals which are the learning outcomes. However, the change due to the current pandemic was unpredictable and even more challenging, especially when the tasks are complex and are facing the issues related to an ever-changing environment (Leicester, 2016).

Through the use of the frameworks which help to better understand and translate organisational knowledge, it is possible to identify the discrepancies between the implementation of new innovation in the normalised pre-COVID 19 context and the transformative innovation of the intervention during the context of disruption. This then provides a means to identify the source of social conditions in an attempt to apply the long-term solutions. In order to be able to carry out this process, it is necessary to understand the different types of knowledge used by organisations, and the ways in which they are used in the different time frames. Critical to this understanding is an examination of the ways in which SBME pedagogical knowledge is produced or reproduced. While many medical schools have adopted blended solutions to assist students with this disruption, a focus on the pedagogical supports for change – as opposed to the social and cultural aspects – often results in resistance to change.

Since this research investigates the nature of SBME and how they can contribute to innovate SBME, bridging and linking SBME implementing factors are of interest. This is because of the nature of SBME, whereby elites, experts and tutors, who come together often do learn from similar perspectives and needs. There is a clear tutor-learner distinction when SBME practices are conceptualised in terms of medical education. The exception in such instances is where tutors are learners, as is often found with some new initiative such as 'learn from student approach'. Such spaces and the people involved in them are increasingly being conceptualised not as tutors or learners, but more as 'change agents', whereby common epistemology and values towards constructivism and an outcome-based education defines medical education practices, which Harden et al. (1997) termed as the 'spiral curriculum'. There is, thus, potential to explore transformative innovation in such instances. However, when exploring SBME as an outcome-based education strategy, making a distinction between pre- (dependent on healthcare system) and post-Covid-19 (dependent on social distancing) is necessary. A further reason why bridging and linking education factors are of notable interest to this research is because education factors are linked to, and are affected by, the context in which it operates and the attitudes of authorities and local it influences (OECD, 2016). These layers therefore enable formal institutions and structures to be analysed to see how they contribute to the outcome-based education and prospects of SBME globally.

2.8 Summary

The world of medical education was not immune to the COVID-19 pandemic issues. Indeed, as medical schools found themselves operating in a disrupted and uncertain global environment, they are finding that the challenges presented by the abrupt disruptions have led to problems in delivering the existing courses. These problems manifest themselves in increased relocated learning communities to less familiar online learning spaces and decreased time to change established practices, showing 'pedagogic agility' (Kidd & Murray, 2020). Kidd & Murray (2020) also argued that the relocation makes many principles and 'intentionalities' of practice to remain unchanged as well as the educators' orientation values. Applying old values to the new environment may represent the strong value systems at the time of the disruption as it is

unclear about what will happen to these new spaces and pedagogical innovations. Educators found possibilities to reframe the traditional practicum and creation of transformation where the 'missing spaces of schools' can be replaced.

The latter part of this chapter focuses on transformative innovation and normalisation process conceptual frameworks (Figure 2.4 and 2.5) that underpin this research. These frameworks are applicable and serve as conceptual points of reference to steer future UG medicine debates that are concerned with healthcare service and education. While outcome-based education has been used as a 'template' through which a framework for SBME and knowledge construction can be built upon, the conceptual frameworks have been used as another template to better reflect their utility within SBME. The main adjustment refers to the deconstruction of the NPT's 'four constructs' and TI's 'three horizons', for SBME and outcome-based frameworks to be relevant. This section needs to be conceptually separated into formal and informal sets of medical education factors. Formal refers to the policies, enacted policies and enabling institutions such as medical councils/professional bodies and medical school committees that facilitate SBME. For the informal, this refers to the ideological and epistemological process of implementation and social constructions of pedagogy that are manifested as key mechanisms, conventional 'face-to-face' and blended SBME, though the time of disruption.

However, there is a link between the formal and informal medical education factors, and the concepts of 'implementation' and 'transformative innovation' enable these to be accounted for. This is a similar concept to that 'linking and bridging' medical education factors and required exploration. Finally, the conceptual frameworks refer to outcome-based strategies and learning outcomes set, and the types of SBME according to the literature: a full range and complexity of health, disease and illness (Harden, 2007). The next chapter turns to the methodology and introduces the two case studies in focus for this study.

Chapter 3: Research Design, Methodology and Methods

3.1 Introduction

The case study methodology allows investigation of multiple aspects of the issues identified to bring holistic meaning to the implementation and transformative innovation of simulation based medical education (SBME). This study is informed by implementation related theory, which is concerned with the emergent knowledge and its application to practical problems through an understanding of the contexts and the processes of innovative implementation (May & Finch, 2009). Consequently, it is possible to investigate phenomena which cannot be placed under experimental conditions. Implementation research can produce useful and practical results and contribute to tacit knowledge drawing from the design, manifestation, and operationalisation of SBME occurring in the pre and during the pandemic (period 2020-2022).

The chapter expresses my research inspiration followed by the methodological aspects of the research outlining the ways that data related to SBME practices and responses to the changing SBME landscape and wider healthcare contexts were captured and generated for two medical schools: one in Scotland and one in Thailand. A case study approach developing comparative explanations was selected and the methods are discussed, followed by an explanation about the phases of data collection. The background of the Scottish and Thai medical schools is presented, as well explanation about how this links to SBME and the research aims, and objectives. This is followed by an in-depth presentation about the Scottish and Thai SBME cases. The research also presents the rationale for analyzing the qualitative data through coding processes associated with case study comparative explanation and logic models identification. Finally, a reflective, critical overview about ethical issues within this research is provided. This is largely based on the experiences that took place in the Scottish and Thai medical schools, with both culturally 'unfamiliar' and 'familiar' spaces that required reflection to carry out effective comparative research. A summary of the chapter is provided at the end before moving onto the results chapter (4 and 5) and then the discussion chapter (6).

3.2 Experiences and Inspiration

The aim of the study is to explore and understand SBME implementation and innovation in two medical schools, through in-depth discussion/interview with research participants for the understanding of their environments. The nature of case study is that it enables researchers to gain an insight from the cases and the participants' perspective on the SBME triad of Task, Person and Context (s) (Dieckmann & Ringsted, 2013). This aspect of the methodology links to the fundamental philosophical position of the research. It serves as a crucial aspect of interpretivist philosophy, where I adopt an understanding stance relative to those who agree to take part (Kezar, 2003), supporting the understanding of 'what is happening' in relation to SBME in that specific setting. Therefore, the key methods that were utilised were elite and expert semi-structured interviews and the analysis of organisational documents.

A single case study was initially considered as an appropriate method in itself because a case study serves a distinct experiment that stands on its own holistically analytic unit (Eisenhardt, 1989). As the study aims to explore and understand the SBME implementation and transformative innovation process, the utilisation of multiple cases allows for comparisons of implementation in real-world settings, providing opportunities for contrast and extensions to the validity (Houghton et al., 2013). The comparative explanations of implementation and innovation processes can be unearthed through this recursive cycling among the two-case data (Manzon, 2014).

The methodology and methods will be outlined to provide a framework to advance the research aims, specifically to comprehend the implementation of SBME within undergraduate medicine at both the University of Dundee (UoD) and Phramongkutklao College of Medicine (PCM).

My interest in SBME and its implementation has been motivated by my professional and academic interest since 2010. My role as a military medicine instructor and a course coordinator allowed me to have an opportunity to see the translation of SBME across the context where medical education is delivered. My work experience prior to my PhD has been

clinically and educationally based. Often in these roles, my SBME-related teaching appeared to be reactive rather than proactively planned and organized. This lack of proactive approach caused me frustration, particularly when I was assigned to the PCM simulation building planning team in 2013. Since then, the implementation of PCM SBME has been discussed as one of the areas to be incorporated into the new PCM undergraduate curriculum. These attempts were led by the PCM educational board following the continuing reform and reorganisation of undergraduate curriculum in Thailand as observed. PCM's approach has been to promote integration, and one of the strategies within this plan involves the utilisation of medical simulations.

My interest in this SBME implementation and innovation has been influenced by my personal desire to understand how SBME can be appropriately implemented in a particular context. This occurred after I did my Master of Medical Education (MMEd) programme during which I had engaged with Dundee Medical School's Clinical Skills Centre and observed alternative SBME deliveries. My concern for the different interpretations and translations of SBME have led to an interest in the normalisation processes (May & Finch, 2009), and the understanding of how new interventions, and ways of working become routinely embedded in practice.

Despite the current interest and widespread implementation of SBME in the US and European countries, a systematic SBME implementation has remained challenging given that SBME normalisation is a difficult notion and only understood in relation to the contexts in which it is acknowledged (Byrne, 2013). There is a greater diversity in types of SBME implementation and innovation in the wider medical education landscape (Byrne, 2013). The local context and the variety of stimuli reflect the growth of medical simulation. A further reason for the different implementation is because there are a range of technological support that can and have been used to achieve a more effective learning experience (Jones et al., 2015) and have sparked the implementation of blended SBME in the time of pandemic where students were excluded from the clinical space (Park et al., 2021).

From my experience during my MMed, there seem to be distinct social elements influencing the implementation, some of which can send mixed messages to implementors regarding the

origin of medical education needs and the significance of addressing them (Holden & Von Kortzfleisch, 2004). Tutors and learners are not experienced with a choice between practice in clinical settings and practice with SBME. Instead, the particular medical education system that tutors and learners engage with embodies varying degrees of implementation, innovation, and SBME embeddedness, driven by a variety of reasons. These reasons are closely linked to local healthcare and medical education needs (Hashim et al., 2016; Ngiam et al., 2021; Utz et al., 2015).

In addition to the COVID-19 pandemic occurring through end of 2019–2021, medical education teaching including SBME is increasingly interested in going beyond SBME debates toward more blended learning perspectives that address issues of transformative innovation (Al-Jabir et al., 2020; Giordano et al., 2021). The role of blended SBME has become the important focus in understanding and developing transformative medical education that are situated in disruptive environment such as developing distance SBME for existing embedded SBME (Sukumar et al., 2021), and more in notions of clinical teaching, experiencing medical practice that has been missed since the pandemic started (Petricaa et al., 2021). There are contextual factors and processes at play in transforming SBME teaching. Comparing these transformative innovations within this research is the scope of the thesis as given these critiques and recent disruptive shifts in SBME, there can still be regarded as important learnings from Dundee and the Thai context.

This is an interpretative-focused research project, where I position myself as a practitioner-researcher aiming to understand and advance knowledge about the theory and practice of innovation (change) in SBME (Acosta et al., 2015). My prior experience in Thailand and the Masters in Medical Education study experience in Scotland surfaced my questions about how and why there were differences between ways of thinking about and practicing SBME in these two contexts.

In this study, I aim to present a realistic understanding of SBME pedagogy used and pedagogical changes as understood and constructed by those who plan and deliver it i.e., the elite educators and medical education tutors. Interpretivism and pragmatism fit this aim and have

guided the research design and analysis when incorporating and recognising the social aspects of educational research and support the use of an interpretivist epistemology.

3.3 Philosophy: Epistemology and Ontology

All educational research is underpinned by an epistemological position, to understand educational phenomena in natural settings, the emphasis should be given to the meanings, experiences and views of the participants. Bray et al. (2014, P. 425) elaborated on this conceptualisation of the research as "researchers need to relate methods to the appropriateness of the epistemological approach selected, i.e., to ask whether the epistemological framework and its methodology correlate and are likely to generate the desired type of investigation". Methodology is, therefore, tied to issues associated with an exploration of how knowledge is constructed and transferred.

3.3.1 Epistemology

The key research questions, aims and objectives of a study present a particular understanding about how the educational world operates and the values that inform the issue studied. In this study, methodology and the types of approaches including methods are described in Figure 3.1 below. According to Figure 3.1, prior to conducting a meaningful and purposefully designed study, attention must be given to the research philosophy and theory. Savin-Baden & Major (2013) clarified the difference between two contrasting epistemological positions within qualitative research, that of positivism and anti-positivism (described next page). They wrote that a key spectrum of ontological assumptions ranges between a realist or an idealist philosophy and whether the social and natural world can be understood in the same way. Importantly, approaches and methodological techniques can and should be mixed and matched to understand the world, based on the researcher's worldview.

Methodology

Ontology
- Pragmatism

Epistemology
- Interpretivism

Theoretical approach
- Inductive approach

Methodology
- Comparative case study

Methods
- Case studies (Elite/expert interviews and documentary analysis)

Figure 3.1: Perspectives in Ontology, Epistemology, Approach, Methodology and Methods
Source: adapted from Savin-Baden & Major (2013b)

The positivist position holds that research is objective and based on scientific approach, separating the issue studied from the world in which it is situated. Conversely, the anti-positivist position recognises the role of subjectivity and that researching the social world is inherently different (Savin-Baden & Major, 2013b). An anti-positivist stance enables me to embrace inter-subjectivity and subjectivity of knowledge production. It allows me to recognise that the issue(s) under investigation also depend(s) on interpretations arising through social interactions as social products. I am interested in the practicality of objects and intersubjectivity of the meaning of educators and making sense of this in relation to the contexts of healthcare service and practice and medical education. I have adopted the anti-positivism position which allows me to account for a truth and to develop a reasoned argument as to why meaning and understanding has been interpreted in the way that it has. This enables an account of SBME as it was constructed by key stakeholders including its (transformative) innovation.

As this research seeks to understand the SBME teaching practices and its innovation in medical education, pre-COVID-19 and at the time of the pandemic in the Scottish and Thai context, the contrast and compare strategy of social and cultural contexts of medical education were applied. An intersubjective and interpretive approach were applicable. This is especially relevant for SBME pedagogical research because, as noted in the transformative innovation conceptual framework, a contemporary world complexity such as social (medical education) embeddedness are a focus for this research. In addition, 'testing' these concepts, the framework is designed to examine the inter-connections between various practical components SBME over a period of time (Leicester, 2016).

An interpretivist approach recognises what is applicable to promote the understanding of an object as how its meaning is constructed in the context. The outcome of this exploration will then require an interpretation of interactions among SBME manifestations, as expressed by SBME elites and tutors. This interpretation will help make sense of how SBME is either transformed or remains unchanged. Therefore, an interpretative perspective is arguably better suited to engage with the complexities of the practical world in a chronological order, as this stance recognises that the research needs to mark the meeting point of description and interpretation, in which description involves presentation of artefacts and feelings and experiences in the everyday language of participants (Savin-Baden & Major, 2013b).

3.3.2 Ontology

The interpretivist epistemology enables pragmatism to be adopted. It is belief that medical education may be interpreted in terms of practicality and its workability (Savin-Baden & Major, 2013b). The understanding of the medical education world should emerge from the understanding of social phenomena and their meanings that are produced through interactions between the holistic understanding (learning outcomes including its policy and management) and the understandings of small parts (SBME sessions and teaching practices) (Bryman, 2012). This is a valuable point of entry for education research which has a sociocultural and practical element to it. The knowledge itself is not pre-given but rather is contextualised culturally and characteristically embedded. For example, this is applicable to the 'curriculum design' process

which is largely a social process that takes place and is shaped by ideology, epistemology and pedagogy (IEP) interplay (Littledyke, 1996). This medical education knowledge is then constructed through various IEP interactions. The transforming structures and processes associated with SBME is therefore well aligned to an ontological approach founded upon pragmatism. As such, pragmatism is an important principle on which this research design has been formulated.

3.3.3 Inductive and Deductive Approaches

As with the positions of positivism and interpretivism, yet again, there is divergence between inductive and deductive approaches to the research process. The difference between inductive and deductive approaches lies with the framing of theory in relation to methodology and data collection. A deductive approach, which is most associated with the positivist tradition, requires research to establish a theory, question, or hypotheses, and to then employ methods to test or measure the hypotheses, enabling some degree of confirmation of initial questions (Bryman, 2012). An inductive approach, on the other hand, is less fixed and allows for more flexibility in how research is approached, and how the data is collected and analysed. For inductive approaches, initial questions are considered before and during data collection and then emerging themes and theory are borne out of the data collection process itself (Green & Thorogood, 2009). Inductive research can be iterative and appear less scientifically structured. It is commonly associated with interpretivist philosophical positions. Qualitative methods are typically associated with this stance and are more suited for this study, as they provide a degree of flexibility and enable the exploration of data as and when it emerges throughout the research process.

Inductive approaches to research have been criticised due to their lack of scientific approach, for example, suggesting that theory could be generated to ‘fit’ with previously published findings (Green & Thorogood, 2009). This is because inductive research depends on the relationships between researcher and data and the interpretations of meaning within. Replicability is an aspect that is used to justify and validate methodology and results, but this is arguably not always possible with inductive approaches, nor with the intention (Bryman, 2012).

Yet this does not mean that inductive research is less valid or meaningful, as researchers have developed particular methodological tools and systems to ensure that inductive academic endeavours retain structure, rationale and credibility (Green & Thorogood, 2009). It is with this in mind that the incorporation of case study design for this project is proposed.

3.4 Research Design: A Cross Timeframe and Cultural (Medical Practice) Case Study Approach

This COVID-19 pandemic resulted in me aborting my original research plan and posed challenges for comparative study. My initial study which was a sequential case study design started as a case study in Dundee following by action research in Thailand, this was fundamentally halted by the pandemic. It was necessary for changes to be made to the study aims and objectives. As the study moved to enable data generation, at distance, I considered how to reformulate the study, having already generated data for the first phase of the study, from the Dundee setting data, (a setting that had sustained and embedded SBME). At the time of the pandemic, many medical schools had to withdraw face-to-face SBME. Consequently, a pressing question arose regarding how medical schools would evolve in the face of the disruption. The reformulated study involved comparison of medical schools' (Scotland and Thailand) responses to COVID-19 pandemic.

This research adopts a comparative case study approach by researching SBME implementation and transformative innovation in the Western European and Southeast Asian regions through a Scottish and Thai medical school comparison, thereby providing a contrasting study context. These case studies provide contrasting dimensions by way of their rich, differing sociocultural, healthcare and medical education contexts (Eisenhardt, 1989). The cross-contextual approach mobilises a methodology that has been overlooked in education research (Manzon, 2014b). This is surprising given that in the context of UG medical education, there are vulnerabilities at play across the globe. Threats to medical education can also impact in ways that are unequal and the strategies to mitigate these challenges are multifaceted and diverse. In light of this, it is surprising that more cross-contextual, comparative studies of SBME focusing on learners' views upon their SBME experiences (Bokken et al., 2009; Williams et al., 2016) which compares SBME implementation in UG medical education, is noticeably absent.

The comparative case study approach enables me to explore the role of context in shaping educators' understanding about what needs are to be addressed and how they can best be met. This enables a deep understanding of how various factors, such as the formal curriculum, medical schools, the medical education system, as well as the informal and hidden curriculum, affect SBME implementation and innovation as teaching, learning and assessment strategies.

The cross curricular element is evident through the study of curricula of different contexts (medical education), backgrounds and practices (Adamson & Morris, 2014; Manzon, 2014). This research falls within this broad methodological remit and offers many theoretical and methodological tools for comparing curricula. While there is an emphasis on sociocultural (practice) context and medical education processes, there is a theme concerned with understanding how medical education strategies, e.g., SBME curriculum, are embedded within UG medicine can be delivered. Critical, cross curricula research is thus an implicit aspect of this research strategy because the aim is to shed the light on shared values and behaviours relating SBME implementation and innovation in the face of the pandemic disruption (Manzon, 2014).

This approach enables processes such as SBME implementation and innovation to be understood in different contexts, which can then be contrasted with other curricula and places, highlighting the similarities and differences among them. This methodological approach provides rich and comparable empirical scope to fully understand the different ways SBME can operate and function, and how these understandings can contribute to the implementation and (transformative) innovation in different contexts.

3.4.1 Comparative Case Study

One of the reasons for using a comparative case study approach in the area of cross-curricula research lies in its practicality. A comparative case study offers better understanding of social (medical education community of practice) phenomena when two or more meaningfully different cases or situations are compared (Bryman, 2012). How meaningfully contrasting the cases at hand are depends on the research topic and the criteria used as the point of comparison (Manzon, 2014). As has been outlined, the case study sites are a Scottish and a Thai

medical school, which are principally justified by way of their geographical positions and contrasting social, cultural, healthcare, and medical education contexts.

Concentrating the study on this aspect of medical school implementation and innovation allows in-depth analysis of emergent data in relation to Normalisation Process Theory (NPT) framework as well as Transformative Innovation (TI). Additionally, this focus allows for investigation of the enablers and barriers to implementation for both medical schools. Given these aspects of the study, it was determined that a case study approach would be suitable to address the study objectives:

- To explore SBME practices in a Scottish medical school (Western Europe) and a Thai medical school (Southeast Asia) and how SBME elites/experts implement and innovate their SBME practice in times of the pandemic.
- To compare the role of contexts and how innovative SBME contributes to the UG curriculum in the two medical schools studied, as well as to consider the wider implications of the findings from a cross-cultural, comparative case study approach.
- To examine the relationships of different micro and macro contexts of medical education and the innovative SBME as well as to develop a framework to inform practical enquiry.

Dawson (1997) describes case study research as an approach to understand and to enable new information to emerge, rather than to develop a universal theory. The research into multiple cases contributes to the body of literature on medical education changes by providing a description and analysis of implementation and transformative innovation as experienced. It offers a means to examine preconceptions and understandings revealed through the course of the case study. This element of the approach makes it a valuable tool in implementation research, as does its focus on the change processes.

Case study research fits into implementation research, NPT and TI paradigms, given its concern with emergent knowledge and it is highly suitable for comparative studies spanning the pandemic timeline. This study looks at the development of SBME (pre-pandemic) and changes

and innovation over the period of enforced social distancing associated with the pandemic (2020 – 2021). The multi-sources available in case study is its strengths as they can be used to frame the context of the issue being investigated and to ensure the validity of the case studies (Yin, 2014b). As the intended outcome of this study is to identify transformative innovation processes which can support medical schools, educators and curriculum developers to understand from change and how the context influences this, the research design requires the application of a methodology which itself reflects the ability to learn from experience. Literature cited explained the boundaries within the case study process as it helps to develop a holistic understanding of where case boundaries are drawn in both contexts. Yin (2014) highlights the relevance of case study research when aiming to describe or explore situations and this can be enhanced by carrying out multiple cases for greater understanding of the complexities.

3.4.2 Background of Case Study Contexts: The Scottish and the Thai Context

The subject of this comparative case study is two medical schools using SBME as part of UG medical education, one in Scotland, one in Thailand. While there are differences in contexts including healthcare services and medical education structures for the cases, there are also many environmental and internal factors which are common to many medical educational institutions. These elements result in a diverse range of factors interacting in varied ways in response to social distancing and the changing stakeholder expectations as they respond to enable medical education, through the pandemic. Over the duration of the pandemic, medical schools, like most institutes, moved away from face-to-face teaching to distance or social distancing teaching approaches (in-person but with personal protective equipment and greater space between people). As technology has advanced, the potential of medical education systems to innovate and support teaching has also increased (Taylor et al., 2022; Vallée et al., 2020). This has led to a greater understanding that innovative teaching can be seen as a product of the medical education. These transformative innovations came at a great cost to medical education sectors. They had to account for investments and faced challenges when COVID-19 placed micro and macro environment pressure on medical schools to effectively manage SBME and UG medicine change (Ferrel & Ryan, 2020; Mian & Khan, 2020). The

complexity of changes occurring made it an appropriate scenario for case study research and to provide insight into medical education change experiences and impact.

To this end, a West European country, Scotland, and a Southeast Asian country, Thailand, were selected as the settings where primary research took place to form two contrasting case study sites. This did not involve researching the extent of SBME in each country, as investigating the scope or representativeness of SBME was not part of the research aim or underlying pedagogical approach. Instead, engaging with a particular type of SBME from each country formed the two case studies and comparable unit of analysis. This approach allowed me to focus on one case study from each country, gaining an in-depth understanding of UG medicine SBME. The justifications for this approach will be explained later in the chapter as part of a discussion about specific methods and techniques that were used.

Scotland and Thailand are suitable contrasting contexts to conduct this research. This is because although there are a few of differences amongst many small-scale SBME in both contexts, they share important similarities in terms of the need to sustain UG medicine during the pandemic. Sustaining UG medicine in this respect is essentially about being able to continue teaching, allocating students within a changing healthcare and medical education landscape meeting the needs of the healthcare service and medical education, ensuring professional relationships with students and/or patients, and generating new transformative innovation if and where possible.

While these needs are arguably global, there are contextual factors associated with geography, socio-economic systems, governance (medical education) and healthcare services conditions where there are clear differences between Western Europe and Southeast Asia (Gervas et al., 1994; Michael et al., 2022; Virasakdi Chongsuvivatwong et al., 2011). It is these areas that provide a lens to understand the context in which SBME used in Scotland and Thailand are situated. Furthermore, it is these areas where comparisons and contrasting analyses can take place to enable an in-depth understanding of the differing contexts of Scotland and Thailand, and to better understand the role such contextual factors have in promoting or inhibiting SBME pre-COVID-19 and in the time of COVID-19 pandemic from 2020-2021.

3.4.3 Western Europe (Scottish) and Southeast Asia (Thai) context

In addition to the outlined contextual factors, another aspect for comparison within this research relates to the medical education position of the two countries. The contextual factors of geography, socioeconomic systems, and healthcare services have a bearing on more than just the medical education system. They also assist in understanding the position of medical education development. While it could be argued that such terminology is inaccurate within temporary global relations, there is value in understanding the Scottish and Thai context from a medical education perspective. It forces researchers/educators to recognize the different needs of those involved in the development and delivery of SBME, as well as identify the difference in the curricula used, infrastructure and institutional support that are required to facilitate the different medical education systems. It thus enables SBME to be understood within a set of governmental, socio-cultural, healthcare and medical education contexts that offer considerably different constraints and opportunities for the success of SBME implementation and innovation. This is an important part of the conceptual framework, and conducting research in countries with contrasting levels of development allows the exploration of the importance of various formal, informal, and hidden curricula and structures. For example, the role of the medical school regulatory bodies, medical school structures, curriculum strategies and quality assurance programmes can be understood within the context from which they emerge. This understanding can be further enhanced through comparison with a country from Europe and Asia. This comparative approach, therefore, enables the understanding of both the universal and context-specific aspects of SBME implementation. To date, this aspect has not been comparatively examined in the literature on SBME.

Table 3.1 provides some basic macro-scale data about the two case studies, highlighting features of the Scottish and Thai UG medicine programmes. From this information, it can be seen that the simulation centre at the UoD site is more established, with SBME integrated through all years of the programme. In contrast, at PCM, the SBME is used sporadically in some departments. As shown in the table, there are both similarities and differences in basic curriculum design. To claim that these data are representative or typical of a more integrated curriculum of the Western Europe and a developing one of the Southeast Asia is debatable.

There is undoubtedly difference in terms of the contrasting contexts, socio-economic situation, healthcare system and medical education system within the two countries. They differ in multiple ways, which allows for a critical examination of the role of context and an understanding of how the hidden, informal, and formal curriculum, structures, and learning processes impact SBME curriculum strategies in each site. However, the knowledge and involvement with existing, comparable SBME in both countries was the initial inspiration behind this thesis. The researcher's links have been capitalised on, making the research practical and achievable within the proposed methodological constraints and scope.

The proxies noted in Table 3.1 are an indication that the curriculum, infrastructure and practices related to SBME for these contexts differ. As such, addressing needs of staff and students and implementing changes will vary. However, according to the rubric of medical education development, the intended learning outcomes are always geared towards supporting the development of graduates who are professional and capable to serve their communities, into the future.

3.4.4 Healthcare Context

Table 3.2 reveals how different Scotland and Thailand are in terms of those involved in healthcare services, as well as the nature of medical education in the two countries. In Scotland, approximately half of the medical doctors work and are registered as general practitioners (GPs), whereas the situation differs for doctors in Thailand. Moreover, general practice plays a much more significant role in healthcare provision in the UK than it does in the Thai setting. In the UK, there are approximately 42,000 GPs working in the NHS (GMC, 2018), while in Scotland alone, there are 5,000 GPs (Scottish Government Health Department, 2018). Population comparison is also used. In contrast, there were only 8,000 GPs registered in the Thai healthcare system (Srivanishakorn & Pruksarutanont, 2019). For the Scottish system, the National Health Service (NHS) is the main service provider (Cylus et al., 2015), whereas the National Health Security Office (NHSO) and Ministry of Public Health (MoPH) collaboratively deliver the Thai health services (Jongudomsuk et al., 2015). Furthermore, in Thailand, the

education of UG medicine graduates also involves the important role of MoPH health facilities in supplementing the placements for Thai medical schools.

Table 3.1: Indicators of Medical Education Development between Scotland and Thailand

Curriculum or teaching feature	University of Dundee (UoD)	Phramongkutklao College of Medicine (PCM)
Course Structure	Integrated curriculum (Outcome-based)	Integrated curriculum (Outcome-based)
Years of study	5 years (pre-clinical/clinical, some integration of clinical exposure in pre-clinical years)	6 years (Pre-clinical teaching mainly by pre-clinical staff/clinical)
(Exit) learning outcomes	Annual assessment of learning outcomes (MCQ, OSCE) No National License Examination	Departmental assessment/ National License Examination (MCQ in year 3, MCQ in year 5, Long Case, MEQ & OSCE in Final year)
Simulation centre	Clinical Skills Centre (established in 1998)	Simulation centre (established in 2022)
Simulation based medical education	SBME implementation across five years of the programme	Departmental SBME implemented, particularly in final year
Simulated patient	Programme wide, Professional Simulated Patient (SP) and SP pool	Departmentally organised SP pool

Source: Adapted from Medical School Undergraduate Office (2014), Office of the Higher Education Commission (2018), and The Consortium of Thai Medical School (2005)

Key: MCQ – Multiple Choice Questions examination, MEQ – Multiple Essay Questions examination, and OSCE – Objective Structured Clinical Examination

Table 3.2: Basic Healthcare and Medical Education Data in Scotland and Thailand

Indicator	Scottish medical school	Thai medical school
Structure	NHS Scotland	NHSO/MOPH
Health service structure	Area/community based	Province based
Medical Doctor Workforce (GP/Consultant ratio)	40/60 (citation 2016)	15/85 (citation 2019)
Primary care	GP practice	Community (District)/ Health promoting hospital
Secondary care	Secondary hospital	Provincial hospital
Tertiary care	Tertiary hospital	Regional/tertiary hospital

Source: adapted from Cylus et al. (2015), Scottish Government Health Department (2018), Jongudomsuk et al. (2015) and Thai Medical Council (2019).

Key: NHSO – National Health Security Office, MOPH – Ministry of Public Health, and NHS – National Health Service

As can be seen from Table 3.2, the locations of care for each country are different, and this translates into the exposure of students to learning in the workplace. Healthcare systems and socio-cultural conditions differ between Thailand and Scotland, leading to distinct needs for medical graduates. This context shapes the development of SBME in the curriculum, as my objective was to understand how SBME can contribute to the outcome-based curriculum of UG medicine in both Western Europe and Southeast Asia.

3.5 Justifying the Scottish and Thai Case Studies

Before the case studies are presented, it is important to detail how and why the case study sites were selected. This research utilises multiple case studies and follows the approach outlined by Yin (2009) for selecting cases. Each case is chosen to either predict similar results or predict contrasting results, but with reasons that can be anticipated. This research employs two case study sites that provide contrasting conditions. The aim is not to seek a direct or literal replication, but rather to utilize their diverse circumstances to arrive at common conclusions (Yin, 2009).

There is value in adopting a comparative case study approach that explicitly uses case studies located within different contexts. Houghton et al. (2013) pointed out the advantages of using

multiple case studies, arguing that they are 'natural' and not artificial creations. Through an in-depth focus on cases, a greater understanding of complex relationships and processes that facilitate convincing and accurate social phenomena can be realized. A further advantage, relevant to the comparative nature of this project, is that case study design allows the researcher the chance to determine context and 'gaps and holes' through the detail of the empirical situation (Ridder, 2017).

A strength of the case study approach is that it allows the researcher to use a 'multiple sources of evidence for comprehensive depth and breadth of inquiry' as part of the investigation (Harrison et al., 2017). It is then essential to properly define the unit of analysis of the case study. As mentioned previously, an UG SBME in Scottish and Thai medical school form the comparable unit of analysis, but this does not necessarily mean that both case studies have equal characteristics or attributes, especially in terms of size, physical space, organisational structure and curricula. Locating case studies that are very similar in two different nations is less valuable given the entirely distinct contexts, though there clearly need to be similarities to ensure that the outcomes of the research are methodologically meaningful and comparable. The unit of analysis that is of particular interest to this research relates to the key principles and purpose of the SBME teaching and responses to medical education landscape changes, particularly from COVID-19.

Figure 3.2 shows influences on the two case study sites UoD and PCM. Although clearly different in terms of their SBME development and UG medicine dynamics, they are comparable. There are various levels/strata related to the case studies, ranging from the Western Europe distinction to the medical school in central of Thailand. These 'layers' show how the term 'case study' requires due attention and critique to locate where each part of the 'case' is situated and how the macro-micro scales within 'cases' relate to one another. This is especially important for this research given that horizontal and vertical medical education embeddedness has emerged in the conceptual framework as important linkages between medical school structures and teaching processes and as key linkages between a medical education asset base and subsequent UG curriculum strategy. The inter-connectedness of the two 'case studies' has

therefore been recognised to showcase how they are comparable to one another, and how the multiple layers are linked *within* one another.

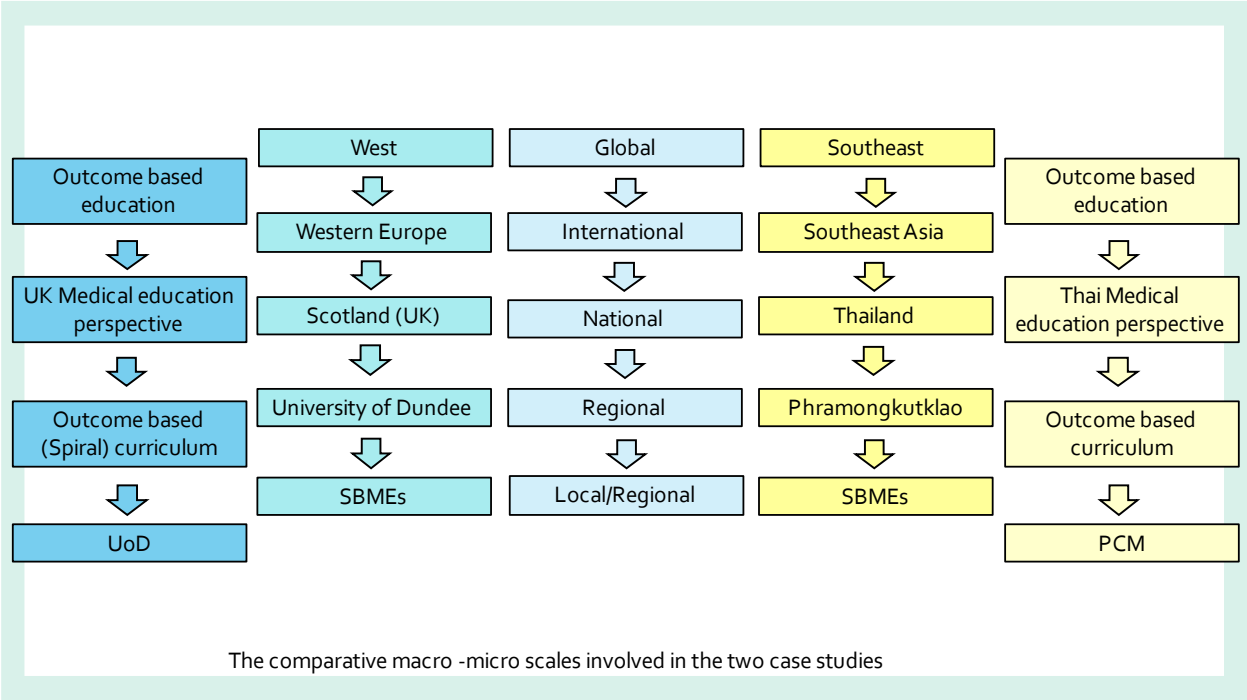


Figure 3.2: The Comparative Macro-micro Scales Involved in the Two Case Studies

The outermost columns of Figure 3.2 show how at the global and international scale, both countries have an outcome-based medical education ethos that then influences the approach to curriculum design. The reference to a medical educational perspective at the national level refers to the diverse outcome-based education systems that are present in developed and developing UG medicine curricula. This is not the focus of the research, but it is important to recognise that outcome-based education is only a part of a nation's medical education landscape. At the regional level, two institutions form part of the case study: University of Dundee in the UK (UoD) and Phramongkutklao College of Medicine (PCM) in Thailand. As will be discussed throughout the following section, these have comparable similarities and enable access to SBME to be gained. At the next level, Thailand, generally, has less *integrated* curricula and relies on the national licensing examination primarily for the national outcome measures (Phramongkutklao College of Medicine, 2015), whereas in the UK there are stated outcomes, which the gradates much attain, but these are assessed by the individual medical school, at a

range of stages through the curriculum (General Medical Council, 2009a). The local/regional scale refers to SBME situated in UoD in Scotland. In Thailand, SBME is situated in PCM, in Bangkok. These two case studies will now be introduced and explained in more detail alongside the specific criteria that were used to ensure a meaningful comparative design was fulfilled.

3.5.1 Case Study Criterion

The two institutional case studies selected can be understood in a variety of ways and from a range of disciplines. For example, they can be regarded as outcome-based education strategies, medical curriculum or, from an integration related perspective, integrated curriculum. However, the area of interest for this research is that they can be conceptualised as institutions that facilitate SBME due to their regional scope and focus on developing links between local/ regional medical schools to local/regional teaching strategies.

Since this research began with in-depth engagement with Scottish SBME, much of the methodological criteria for a comparative Scottish case study developed from iterative reflection on the research aims and data collection with Scottish SBME. For example, if a comparative case study had been selected from the beginning or at an early stage of the research process, then the 'wrong' kind of case study could have been selected. Table 3.3 highlights and summarises some of the differences and similarities between Scottish SBME and Thai SBME that was known before any primary data collection took place.

Table 3.3: Initial Comparative Aspects of Two Selected Case Study Sites for Research

Case study variable	UoD	PCM
Location	Dundee, Scotland, UK	Bangkok, Thailand
Local/Regional scope	Work with tutors in the Dundee medical school (medical school staff) and Ninewells hospital (NHS staff).	Work with tutors in Phramongkutklao College of Medicine and Phramongkutklao hospital
Type of Organization	De-departmentalised medical school*	Departmentalised medical school
Typology of SBME involved	Small-scale SBME used systematically and progressively across five years	Small-scale SBME used individually depending on the responsible department
Key aspects and characteristic of SBME	SBME using systematically as part of the lessons, directly linking students with exit learning outcomes (local needs) Have a clinical skills (simulation) centre (since 1998)	SBME using as a part of the lessons, not directly linking students with exit learning outcomes (local needs) Have a simulation centre (since 2022)
Typology of learners using the simulation centre	Medical students, nursing students, dental students, postgraduate trainees	Medical students, nursing students, postgraduate trainees

*An attempt to maintain research excellence across all the traditional clinical specialties led to a creation of new units based on research-led categories (Wynford-Thomas et al., 2012).
Source: Generated from UoD and PCM strategic frameworks documents

As captured in Table 3.3 the two organisations have a similar remit and purpose in terms of instigating SBME, although UoD is a medical school that supports civilian students to study, whereas PCM is a military owned medical school supporting both civilian and armed forces.

However, both cases have a 'UG medicine education' obligations. Both organisations also make reference to place in their names (UoD, PCM) as a means to construct quality, which as noted in the literature review, is an integral part of the General Medical Council (GMC) (UK regulatory body) and The Medical Council (TMC)(Thai regulatory body) differentiation.

3.5.2 Criteria for Selecting Case Studies

The following five criteria elaborate why PCM and UoD as case studies at the institutional level were selected.

3.5.2.1 Type of SBME: Proximity criterion

The criterion used in the selection of cases for this project related to their core aim(s) and the type of SBME as originally conceptualised by Ker (2003) and Weller et al. (2012). They attest that SBME can be characterised as being face-to-face, proximate, or extended. The important aspect in all cases is that the products are embedded with information at the point of teaching or learning, but how this occurs may vary depending on the scale, proximity relations and outcomes set. The two institutional cases selected for this research, PCM and UoD can be originally conceptualised as facilitating proximate SBME due to their original focus and purpose around linking interactive clinical experiences to local and regional medical or healthcare needs. For example, PCM operates in the two regions of civilian and military health services which are located around the country. Similarly, UoD graduates operate throughout the regions of Scotland and the UK. These features are the first key replicable features of the case studies.

3.5.2.2 Small-scale SBME Emphasis

A second aspect that is relevant is the emphasis on SBME. Since this research critically engages with transformational innovation (TI) of SBME, an organisation whose focus is primarily about enhancing the achievement of learning outcomes of UG medical students within a particular region warrants investigation. Both UoD and PCM were largely conceived to provide some form of SBME to students, either by providing a session for their students (face-to-face SBME) or other collaborative assistance such as clinical exposure, medical skills training events or

workshops. Without such interventions, many learners would arguably remain marginalised from their respective practical medical education.

The focus on small-scale SBME is because unlike larger complex SBME, small-chunk SBME have fewer assurances and options available as to where and how their sessions can be delivered and feedback can be given. Moreover, they may be unable to consistently provide sufficient quantities of SBME sessions demanded by UG medicine curricula. The role of SBME as a means to prepare is therefore particularly important for early years medical students, as unlike exit learning outcomes, they require their students to be developed and professionalised as more than just students, using 'quality cues' associated with learning outcomes, quality and transparency as ways to improve their competency and other students in a wider medical education community. This leads to the third criterion about quality.

3.5.2.3 Healthcare Needs Differentiation through 'Outcomes'

Both UoD and PCM refer to the notion of outcome in terms of the teaching being dispersed throughout the curriculum. The notion of outcomes being inherently aligned with the curriculum was discussed in Chapter 2. Moreover, quality is a central feature of SBME, as embedding SBME with meaningful safe and effective learning environments for students enable certain types of outcome cues to be communicated and interpreted by both tutors and learners. This is the value-laden education techniques that Weller et al. (2012) refer to.

By incorporating the notion of learning outcomes into the methodological case study research criteria, the nature of SBME can be brought into focus, understanding how they are constructed throughout different points along the curriculum chain and how notions of outcomes are integrated and delivered. Attention to quality is essential as it is arguably the locus where SBME can become more than just a teaching tool, communicating wider social, cultural or environmental 'cues' that are inherently associated with the production of SBME. Moreover, exploring the link between outcomes and SBME provides a greater understanding of how concepts such as outcome-based education and SBME are communicated, and how the linkages between SBME are both constructed and maintained.

3.5.2.4 Teaching and Delivery

The previous criterion refers to how organisations such as UoD and PCM can provide assistance for tutors in terms of generating a SBME practice, which can be achieved by providing tutors' training courses and fostering tutors' networks. This means that the responsibility for teaching is transferred from the individual tutors and internalised by the institutional responsible bodies. Since teaching within medical education inherently involves delivery, some of the more practical issues associated with facilitating SBME can be critically assessed and compared in relation to the different contexts in which they are situated. This is an important point to relate data back to the conceptual framework such as the transformative innovation that occurred in a changing landscape. Indeed, understanding how practical factors associated with moving lessons from 'traditional face-to-face lecture to face-to-face SBME' and 'face-to-face SBME to blended SBME' were enabled or presented as challenges is an important part of this research.

3.5.2.5 Health Service and UG Medical Student Learning Environment

The nature of the medical education, as the focus of the study, should be closely aligned in order for any analysis and conclusions drawn to be comparable. If case studies were selected where the learning outcome base was situated within very different contexts, then the nature of the teaching techniques become unique to their context, limiting the usefulness of the overall findings. Both PCM and UoD support students to enter healthcare services that are located in the community and hospitals, although the Scottish case has more graduate doctors entering general practice, than the Thai context.

The five methodological criteria above provide the structure and rigour that is needed to ensure that the two case studies situated in different contexts retain a degree of similarity. As previously outlined, the research design began with UoD and so initial considerations for a UK comparison began with 'familiar' initiatives that have been commonly researched within recent SBME literature. The initiatives that were considered for case study selection included a simulation centre, a training centre and SBME supports. These were considered due to their SBME conceptualisation in terms of reconfiguring how SBME is produced, delivered and

innovated, and because the UG medicine teaching within and from them takes place through SBME. A further two important reasons for the consideration of such alternative systems was due to their typically local and/or regional scale of operation or focus on forging closer relations between tutors and students. However, these scenarios/contexts were deemed insufficiently 'similar' to the UoD context, in relation to criteria outlined above and so were discounted. The additional feature which influenced selection of PCM was my understanding of that setting and the positive reception from PCM to explore SBME at that site, due to connections with that site as previously mentioned (see section 3.2).

The way case studies are approached has a bearing on the types of methods and techniques needed to answer the research questions. This section of the methodology addresses this element of the research process. (Savin-Baden & Major, 2013a)

As has been noted in the discussion about research philosophy and comparative studies, that the researcher must remain flexible and adaptive, and continuously review their evidence during data collection, asking why events or facts appear as they do (Yin, 2014a). Yet, case study can be considered more of a research *strategy* that enables qualitative data to be analysed. More specific techniques are required to fully engage with the multiple layers and complexities of the case studies and the individual research participants. It is this aspect where a discussion about the qualitative methods that were used in this research requires critical discussion, outlining the reasons for implementing the particular data collection techniques. This takes place alongside detail about how the UoD case study was researched, and then how PCM was investigated using the methods prescribed.

To summarise, this section of the methodology has outlined the case studies in greater detail and introduced the criterion that have been used for selection. The following section provides a more in-depth discussion of how the primary research took place, and also explains the specific methods and techniques that were implemented as a means to gather data. Following this, the data analysis process is given, followed by a closing discussion about research ethics and consent.

3.6 Justifying the Use of Multiple Methods in Case Study Adopted

As the study requires an *understanding* to be gained about innovative SBME in both UoD and PCM, and to comprehend the complexity within, a range of qualitative methods were incorporated in line with the interpretive philosophy and the more robust multiple-case design approach to the analysis (Yin, 2014a). Exploratory qualitative methods were deemed appropriate to address the research questions and collect the necessary data as they are characterized by enabling an in-depth qualitative approach rather than a numerical approach.

Capturing educators' experiences or understandings the issues studied required a method, where respondents are afforded the opportunity to elaborate or to raise themes and topics that may not have initially been regarded as relevant from the outset by the researcher. The possibility of gaining in-depth insights about either implementation or innovation processes required qualitative methodologies and techniques.

As the pandemic disruption of education was novel, too new to understand in depth (Ridder, 2017), there was no existing theory which could account for the influence on innovation and change. The research strategy for the case settings lies in understanding the disruptive implementation and innovation processes and manifestations associated with the pandemic. The aim of this study is to advance understanding of SBME implementation and innovation (or the lack thereof). The literature emerged from the pandemic signaled that innovation was apparent, indicating a time ripe for the study of innovation.

Ridder (2017) compared a range of case studies and found that they were mainly of exploratory and explanatory design. Explanatory, interpretivist, and critical/reflexive designs are more neglected, narrowing the possible applications of this intrinsic case study research. This current intrinsic case study will enhance the understandings of g new phenomena. An intrinsic case study is one where the material is provided in a sufficient way to understand the case with the interpretation offered (Ridder, 2017). This specific case study research design is then building context-dependent knowledge with regard to the identification of new phenomena and models (Ridder, 2017). The openness regarding the response to new phenomena (COVID-19), without

theoretical preconceptions, requires building insights out of data and enables the elaboration of meanings and the construction of realities related to the case studies. The underlying logic is validation by replication which is similar to Yin's multiple case studies logic (Yin, 2014c). In imitation logic cases, where these confirm the emergent relationships, this enhances confidence in the validity of the relationships.

Prior to undertaking the case studies, as described earlier it is important to determine the cases and methods that will be used in the study (Yin, 2014b). As the aim is to identify the features/attributes of each case, a thick description of the SBME implementation from the information and data gathered for each case needs to be identified and interpreted. A summary report is then produced, including the individual cases *and* the cross-case findings. The individual case report should indicate the reasons a specific proposition was illustrated or not. The cross-case report should indicate the extent of the replication logic, and also the reasons that certain cases were predicted to have certain results or to have contrasting results. The dashed-line feedback loop (see Figure 3.3) represents the event where important findings happen while undertaking the case studies. This may lead to one or more reconsiderations of the study's original framework. The study should address this change(s) to avoid being accused of accommodating the original design.

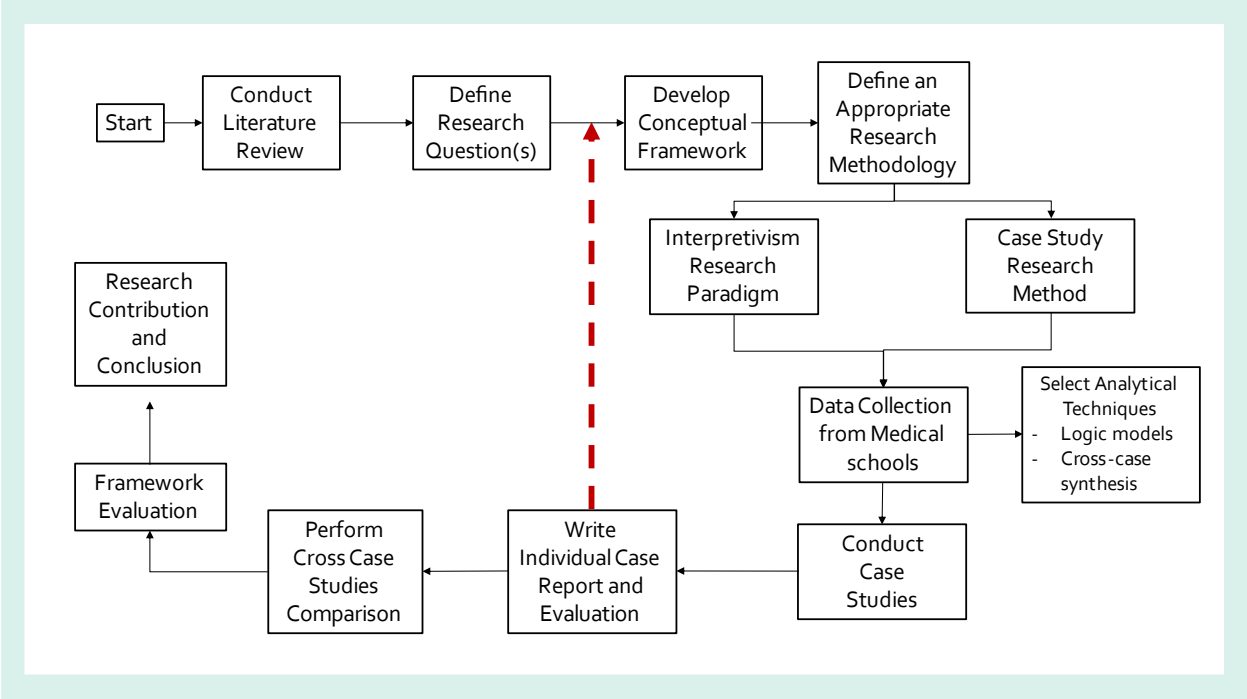


Figure 3.3: Empirical Research Design
Informed by Eisenhardt (1989), Adamson & Morris (2014) and Yin (2014)

The logic model building process capitalised by iterating case data, emerging logic model, and literature, disconfirmation of an integrated, holistic comprehension of the case complexities leads to refinement of the model (Yin, 2014a). This targets the precision and measurement of constructs and the emerging relationships with regard to the emerging model. The building of a logic model concludes in an understanding of the repeated cause-effect-cause- effect patterns, whereby an event at an earlier stage becomes the causal event for the next stage (Peterson & Bickman, 1992; Rog & Huebner, 1992 cited in Yin, 2014a). Finally, a visual theory with ‘‘boxes and arrows’’ (Eisenhardt & Graebner, 2007) may visually demonstrate the emergent models.

The design is adapted from Eisenhardt (1989) and Yin (2014a) and tend towards a research plan that aims to develop new constructs and matching new relationships out of real-life cases. Data are collected mainly by elite/expert interviews, analysis of the familiarisation documents and partial personal experiences of both settings. From within-site analysis and cross-case analysis, themes, concepts, and relationships emerged.

The progressive and continuous nature of using a logic models technique, matching empirically observed events to theoretically predicted events, is a power and substantial feature of this method. This characteristic allows flexibility and continuous sharpening of emerging constructs via familiarisation with data, validation, and expansion of knowledge and skills. This study adapted the Yin (2014a) logic model that adds components from the strategy of rival (comparative) explanations to include the important role of comparative chains of events. The conclusive logic model could then be reached by the explanation of the findings.

3.7 Data Collection Methods

The selection of a data collection method depends on the research topic, research method, and availability of data. The data collection method should allow the researcher to gather all the information to answer the research questions and achieve the objectives (Myers 2009). The primary aim of data collection was to get as close to the organisations under study as possible. However, the nature of the research requires access to organisations that work in a very dynamic education field. As a result, it was expected that access to elites and expert tutors would be challenging, due to their commitments. Indeed, one of the known disadvantages of case study research is the difficulty in gaining access to the particular institution (s) that the researcher intends to study (Myers 2009). This is because organisations can be skeptical, in terms of the value of the research for themselves. Specifically, institutes may have concerns about the drain on resources, e.g., through data collection as well as concerns that the findings may have a negative effect on the institute's reputation.

According to Adamson & Morris (2014), curriculum related documents, such as policy documents and study guides, can provide additional evidence that can build a richer picture than could be obtained by interviews or fieldwork alone. Such documents can be valuable that they can become the object of extensive analysis (Yin, 2014b). Documents are also stable and can be reviewed repeatedly, giving an unobtrusive view, yet having broad coverage of ways of thinking/planning over a long time span (Bowen, 2009). As mentioned earlier, the research attempts to gain access to the resources of the organisations under study which are relevant to the study propositions and questions. Accordingly, it was decided that the most effective way

to achieve the desired outcome was to seek to obtain policy documents and the study guides which were used to inform SBME teaching for the case sites. The purpose was to use these data to execute an enacted SBME implementation and transformative innovation using the NPT framework. It was expected that the organizational documents would give insights into the usefulness and practicality of the conceptual framework using real world data, which is used in real-world implementation. Therefore, the data used to evaluate the SBME policy and enacted SBME implementation was acquired from two data sources from both medical schools. The following subsection provides an overview of the case study data sources used to deal with data collected from the medical schools.

3.7.1 Semi-structured Elite/expert Interviewing and Documentary Analysis

The preceding section outlined and justified the methods used in the research, and also elaborated in more detail about the nature, context and extent of research participants in each case study context. The following section provides a more detailed discussion of data analysis and outlines how the analysis of qualitative material is situated within the broader logic model technique.

Elite/expert Interview

Semi-structured interviewing is the applicable to this research as there is a pre-determined line of questioning along with scope and flexibility to allow unforeseen topics to be explored, allowing the researcher to elicit more information about the issues important or significant to participants (Stephens, 2007). Furthermore, elite and expert (tutor) interviews are reasonably formal but conversational in nature and enabling the establishment of relations and development of a rapport with participants in a constructive, professional manner. The following lists the inclusion criteria used to recruit the interviewees:

- Elite: Person(s) who had the idea(s) and took SBME to implementation and/or enabled SBME change to happen by providing support or resources (e.g., board member, director, manager)

- Expert (tutor): Person(s) who were involved in delivering the SBME (a diverse group, e.g., clinician, non-clinician, tutor)

This study does not involve data collection with students or learners (recipients) or those who are bystanders i.e., those who are outside the organization.

Elite and expert interviewing has a significant role within this research project, as talking to elites and experts in the exploratory phase of a project is 'a more efficient and concentrated method of gathering data than, for instance, participatory observation or systematic quantitative surveys' (Littig, 2009). Moreover, the qualitative interview allows a more thorough examination of experiences, feelings or opinions in comparison to a more rigidly structured method such as a questionnaire (Palinkas et al., 2015). The interviewing approach adopted enabled the time, mode of connection, people and nature of questioning and duration to be modified to support. Outline of the approach to developing the semi-structured interview guides is presented in Section 3.8.

Organisational Documents

In this study, findings from the documentary analysis were used to provide important research data as they can generate 'the development of new text' and also a 'means of tracking change' (Bowen, 2009; Wild et al., 2010). The organisational related documents will not only manifest the formal curriculum of SBME, but they will also demonstrate the historical, pedagogical and planning systems underpinning the curriculum (Adamson & Morris, 2014; McKenzie, 2017). The analysis of curriculum related documents including, the policy and curriculum documents, teaching materials, lesson plans, and assessment materials, can demonstrate the intended formal teaching/learning as produced by academics and management (McKenzie, 2017). The study also includes documents from journal articles that provide a source of historical and contemporaneous data and a counterbalance to the message from the elite and expert interviews which can be used to corroborate across data sets to reduce biases (Bowen, 2009).

The analysis of these documents was used to develop understanding of how SBME knowledge was translated in different contexts. It is through the institutional communication to staff and

expressions of the medical school's vision, as well as strategies that could help contextualise implementation (Adamson & Morris, 2014). There can be misunderstanding and misinterpretation of messages or contents related to the planned/written curriculum and the teaching staff (Harden et al., 1999). I selected documents to help my understanding of how institutional knowledge was transmitted, taking into account the inherent organisational culture and practices.

A purposive sampling strategy was also used to identify organizational documents to be included on the basis of comprehensiveness, detail and accessibility (Miller and Alvarado 2005). The documentation sampled aimed to provide an understanding of the issues including disruptions which would impact on SBME pedagogy. The documentation analysis guide used to inform chapter 4 and 5 are described in Appendix 2.

To further inform the sample the following inclusion criteria were used:

- Policy related documents: Document(s) which had the SBME as planned and intended for implementation and which enabled SBME change to happen (e.g., policy, curriculum documents, contemporaneous journal articles and etc.).
- Study and assessment guides: Document(s) which had the SBME as enacted including teacher and student action; roles of teachers and students and classroom interactions (e.g., study guides, lesson plans and OSCE assessment forms).

The chapter where the relevant study aim and objectives are addressed also has an overview of how the research process has evolved while remaining close to the original questions. The research process within both PCM and UoD is now presented in more detail, providing an overview of the number and types of participants involved and documents accessed.

3.7.2 Researching UoD

As has been noted in the introduction, I had prior knowledge of some staff at UoD related to my Master in Medical Education studies, I was in part familiar with the simulation centre (location, set up) due to visits to the site and I had some contacts with SBME staff.

Initial interviews were initiated in 2019. These links were capitalised on to enable the qualitative, inductive methodology to be convincingly achieved. Firstly, the interviews were initiated as part of a study in March 2019, generating ideas and contacts and understanding how it relates to the overall research topic. The scoping visit and formal interviews were with key informants at SBME management level. This provided an initial basic understanding about SBME and generated a degree of access to SBME and the simulation centre they work with. This is an important part in implementing a successful qualitative methodology. A further reason for scoping was because the extent and nature of the research field, or at least the actors that constitute this, was not fully known or able to be known prior to primary data collection.

As a result of the pandemic disrupting education prior to the start of my original second phase action research study in Thailand, a new second, UoD interview and documentary analysis phase was enacted through September – December 2020; when the pandemic had resulted in closure of medical schools from March 2020 in the UK setting. During the pandemic-affected phase, interviews were conducted online (using MS Teams). In this way, the research was able to be conducted in a longitudinal fashion, continuously maintaining rapport with participants and creating access to others. Furthermore, by implementing documentary analysis, a more comprehensive understanding of the context in which the case study was situated was achieved.

Interviews and related details were recorded using a notebook initially, and later transitioned to online video conversations during the pandemic. The interviews were recorded and transcribed (further details to follow). The reason for the two-phased approach to data generation at UoD was due to re-direction of the study (due to the pandemic). The qualitative nature of the study and the ability to capture data, at distance (using MS Teams and email communication/sharing of policy documents etc.), enabled the study to progress.

UoD Sampling

A Masters by Research project about outcome-based education by Harden (1999) and a consultation report by Scottish Deans' Medical Education Group (2008) provided some helpful

background to support preliminary thinking and context about UoDs educational offering and ethos. Harden (1999) discusses the role of learning outcomes for UoD undergraduate medicine and how to implement them, and Scottish Deans' Medical Education Group (2008) analysed learning outcome structure and made recommendations as to how this might be improved and assessed at UoD. It was of course noted that these documents were 15 and nearly 25 years old and in relation to personnel, were not useful.

SBME elite and experts at UoD were identified as the research unfolded as opposed to having a more rigid sample structure framed ahead of the interviews. This ensured flexibility in identifying participants, complemented the extended period of time spent in Scotland, and provided scope to recruit UG medicine SBME elites and experts who were usually located at the medical school. In this respect, the UoD Clinical Skills Centre (CSC) director served as a valuable guide in identifying elites and experts. Understanding the implementation and SBME curriculum strategies of UG SBME was the main focus of the research. However, other actors involved in UoD medical school were also incorporated. These included those involved in teaching, including simulation centre management staff and medical school management staff. These participants were incorporated into this research to gain a fuller understanding of SBME dynamics in the UoD medical school and to situate SBME in a broader regional and national context (see Table 3.4). This flexible and responsive approach to data collection aligned with the inductive and qualitative foundations of the project. A more detailed exploration of SBME and the related curriculum is presented in Chapter 4.

Table 3.4: The Profile and Extent of Elites and Experts and Documents from UoD

Participants (Elites/experts)	Number of participants involved with research	
	Pre COVID-19 phase	COVID-19 phase
Elite	1 Ex-director 1 UG manager 2 UG head 1 SBME director	1 SBME director
Expert (tutor)		6 SBME tutors
Organisation Documents	42 study guides	13 policy documents 37 study guides

Source: Author

3.7.3 Researching PCM

The methodological approach for researching PCM was similar to that of UoD, whereby re-establishing contact with staff at PCM was the first task. The key difference in the early stage of research with PCM was that I know more information available due to my previous role at PCM. Research with PCM took place after the in-depth research at UoD to ensure that Scottish medical school case study was ready for comparison. PCM aligned with the five key criteria discussed earlier in this chapter. While the methodological approach to each case study was largely the same, as was the types of methods used, the implementation and conduct was different primarily due to logistics. The first area of divergence was that researching in the Thai medical school did not necessitate an extended period of time spent in close proximity to the research participants, as was the case in Scotland. As such, research with PCM took place online only, for interviews.

Research began by contacting PCM to learn more about the current organisation situation and its remit. No assumptions were made based on historical interactions. This involved telephone and videocalls (using MS Teams) where it became clear that there are two distinct aspects to PCM: the medical education division and the responsible departments. In PCM, any SBME responsible person who wished to be associated with or utilise SBME had to become a member, although it is not mandatory for members to practice SBME teaching.

Research began by identifying elites and experts followed by online interviews with staff at PCM. Similar to the UoD site, the relevant parties included those who were both hospital and college staff. This was because while some of the hospital faculty have teaching roles, they also operate through the UG curriculum. SBME tutors at PCM were identified and also approached by email (including information about the study and consent) and/or telephone contact, initially by the someone they know with an unequal power relationship to them and an interview arranged depending on their response.

PCM Sampling

As with UoD, PCM had an organisational gatekeeper. To gain permission to approach SBME tutors at PCM I sought permissions from the Director of Education Affairs department. Through this office there was access to a staff directory, where elites and experts could be identified. The contact was established via the deputy director of Education Affairs department who was in charge of PCM Centre for Medical Education. As sampling in PCM relied on developing contacts within PCM in order to access participants, the specific SBME directory made purposive sampling possible. As has been outlined previously, sampling consisted of contacting elites and SBME tutors who fitted the methodological criteria of being SBME related elites/experts, and whose range of responsibility was local. Table 3.5 summarises the research participant profile from the PCM case study.

In total, fifteen interviews were conducted, of which twelve were with SBME tutors located in both the medical school and teaching hospital. The other three interviews were with PCM medical education affairs director and elite. This was because it was necessary to gain a detailed understanding of broader PCM departmental practices and PCM networks specifically. A more detailed breakdown of the departments involved in this research, and the types of SBME they used, is presented in Chapter 5. As such, semi-structured interviewing in combination with documentary analysis were the primary methods of data collection in both Scotland and Thailand.

Table 3.5: The Profile and Extent of Elites and Experts in PCM

Participants (Elites/experts)	Number of participants involved with research
	Pre/ in the time of COVID-19
Elites	1 Director 1 Deputy director 3 Department heads 1 senior consultant
Experts (tutors)	9 SBME tutors
Organisation documents	2 Policy documents 12 documents in relation to study guides including one OSCE exemplar

Source: Author

3.8 Data Management and Analysis

Data Management

This research utilised a range of methods to gather data. The use of digital voice recorders (MS teams) and organizational documents were the main formats through which data was 'captured' and 'documented' during data collection processes. It must be noted that *participant* interviews and organizational documents were used during data collection in *both* UoD and PCM.

The qualitative data from both UoD and PCM has been gathered by means of semi-structured interviews and organizational documents (see Table 3.4 and 3.5) that directly explored the SBME implementation and innovation. Interviews and organizational documents were digitally recorded and the interviews could be transcribed. All documents, recorded files, transcripts will be anonymised and stored electronically by using password protection and data encryption. They will be kept in a secure university computer network or stored in a lockable cabinet at the Centre for Medical Education for a period of ten years.

Since there was a range of participants, two semi-structured interview schedules were developed (see Appendix 3). The two schedules catered for SBME elite and experts in Scotland and Thailand. The schedules were based on the conceptual framework (see Figure 2.5, Chapter

2). For example, the schedules used addressed topics and questions linked directly or implicitly to SBME and medical education strategies that are integral aspects of the conceptual framework. For the organisational interview schedules, topics and questions focused more on the contexts and the broader SBME role that UoD and PCM have had within the *pre*- and *in the time of COVID-19 SBME teaching* processes. This approach enabled the conceptual foundations of the research to be applied during data collection and analysis.

Twelve (UoD) and fifteen (PCM) interviews with SBME elites and experts were conducted, resulting in a total of twenty-seven tutor interviews that directly explored the relationships between SBME, the UG curriculum both pre and during the pandemic. The organisational documents that were analysed with representing both settings planned and enacted curricula (See Table 3.4 and 3.5).

NVivo, a computer-aided qualitative data analysis software (CAQDAS) programme, was originally considered to conduct both phases of data analysis. It was not possible to input all the data into NVivo as some of the encounters, interviews in PCM were digitally recorded but all interviews were in Thai and could not be transcribed and translated verbatim. Moreover, much of the PCM organizational documentary data recorded in Thai could not easily be converted into an English format. Converting some of the Thai material into an English format may also lose the originality and raw qualities that were captured, especially during the translation processes. As such, manual coding in Thai was deemed the most effective approach for all of PCM transcripts and documents and then translated into English. Although the organisational benefits of NVivo were not capitalised on, the coding process was consistent throughout.

Data Analysis

Analysing case study evidence can be a challenging process. Yin (2014a) proposes a strategy to guide the analysis of case study evidence. By using both interviews and documents, qualitative data, the analysis consists of two analytical strategies: a) examining rival (comparative) explanations, and b) relying on theoretical propositions.

This research, being based on two case studies, recognizes the value of cross-case synthesis as a valuable technique for analyzing case study evidence. The analysis of multiple case studies is likely to produce more robust findings (Yin, 2014a). This technique treats each case study individually. It consists of designing a table which displays the data from individual cases based on uniform NPT framework dimensions. The aim is to facilitate the identification of cross-case patterns. In other words, it provides a foundation on which the research can build plausible, and fair arguments to support the validity of the conceptual framework with empirical data. Finally, Yin (2009) suggested four main criteria by which high-quality analysis can be achieved:

• The analysis should consider all the evidence. (see Section 3.7)

• The analysis should consider all major rival (comparative) explanations. (see Section 3.8)

• The analysis should consider the significant aspect of each case study. (see Section 3.7)

• The researcher should use prior, expert knowledge in each case study. (see Section 3.7)

3.8.1 Examining Plausible Comparative Hypotheses

Examining comparative hypotheses is an effective strategy, which can help seek out comparative explanations, examine their plausibility, and yield strong evidence supporting (or not supporting) the validity of the conceptual framework used (Yin, 2014a). Indeed, identifying comparative explanations and performing comparisons with the study propositions can add more confidence to the overall research findings. This strategy consists of defining comparative explanations to the NPT and TI frameworks. In this study, the research identified emerging themes and four main possible comparative hypotheses to execute the SBME implementation and innovation processes at pre and in the time of COVID-19 pandemic. The comparative explanations were provided in the Table 3.6.

3.8.2 Relying on Theoretical Strategy

Making use of theoretical propositions strategy is about following the conceptual framework proposed for the case study (Yin, 2014a). Table 3.6, the descriptive approach including null hypothesis approach which was used to identify causal links to be analysed. The TI and NPT framework components were used to investigate on certain aspects of SBME innovation and

implementation, which are an embedded unit of analysis and an overall pattern of complexity to explain why implementations had occurred as they were.. Based on the NPT framework, four constructs were selected to explore the 'slice of data' in these case studies.

The first theme is the *coherence*, the sense-making work, one of the NPT constructs (May & Finch, 2009). This includes the differentiation of the innovation, sense-making process, and internalisation of value, benefits and importance of a new practice. For example, the common cognitive ground change includes the educators understanding and recognising priorities based on innovation values that enable to effective diffusion of the innovative solutions (Hodge et al., 2008). These components can be the focus of attention when conducting the case studies, where evidence supporting (or not supporting) their validity is one of the key subjects of analysis.

Table 3.6: Plausible (possible) Comparative Hypotheses

Type of comparisons	Description
Craft comparisons:	
1 The null hypothesis	The local contexts (Pre and in the time of COVID-19 pandemic) of both Dundee and Phramongkutklao influence the implementation and innovation of SBME.
2 Threats to validity	Local contexts e.g., health needs, health system and curriculum
3 Investigator bias	Positionality of the researcher e.g., participant observation effect
TI and NPT based comparisons:	
Emerging themes under transformative innovation framework	SBME implementation and innovation related factors
Coherence	Sense making work of UG medicine that tutors do contributes to relation work in utilising SBME account for the implementation and innovation.
Cognitive participation	The relation work that SBME tutors design and deliver leads to build and sustain community of practice around SBME.
Collective action	The SBME operational work improves engagement and collective action and then minimise the amount of work required by the participants.

Reflexive monitoring	When the effectiveness of a complex trial intervention has been proved to benefit the system (when focuses on the optimisation of the trial parameters), it can then be modified, developed and widely implemented.

Source: Adapted from Murray et al. (2010) and Yin (2014a)

The second theme is the *cognitive participation* component, relational work, in the NPT framework (May & Finch, 2009). This theme seeks to verify the process of gaining participation of those involved and enabling the implementation to sustain a community of practice. The two case studies would require the mechanism to align the strategies with the collective values to complete the implementation. Therefore, the case studies would provide empirical information to understand and discuss whether the recommended steering mechanisms in the NPT were useful for both contexts.

The third aspect is the operational work that tutors do deliver practices, representing the implementation and transformative innovation. This theme is concerned with evaluating whether the two case studies provide pedagogical concerns and collective actions. For example, the case studies can help illuminate the nature of SBME design and implementation to suit local needs and resource availability.

The fourth theme focuses on the appraisal work of the implementation. This is to assess whether the current implementation provides the necessary functions to deliver SBME teaching. This theme seeks to determine how effective and useful the innovation is. The appraisal work may involve the attempts to modify the intervention to make it workable and better delivery in the face of future disruption.

In other words, the framework(s) can help organise the focus points for analysing the case study data. In addition, it will help to identify rival methodologies which provide explanation for the comparison evidence.

This study will apply a combination of explanatory building and the logic model as analytical techniques. This pattern matching approach will be used to trace and explain the casual links for both UoD and PCM SBME approaches. The causal links explained will reflect the

propositions and lead to recommendations for future study (Yin, 2014a). The series of iterations will be used to examine evidence, revise the proposition, and revisit the evidence from a revised perspective. Since the iteration process might create an unwanted selective bias from some key data (Yin, 2014a), I revisited my original purpose, re-examined the propositions to check the focus was not deviating from the original aims.

The logic model will be used as another analytical tool. This technique adds the lens of sequential stages to the explanatory building tool (Yin, 2014b). The process of implementation will be charted and described. The results will be cross-checked and matched with the collaborative production of the SBME tutors which is the explanation of the SBME implementation.

The logic model requires the extraction of cause-and-effect chains of events and the explanation of how the intervention produced the ultimate the outcome (Yin, 2014a). It is anticipated that the explanations presented by in elite/expert interviews can be used to highlight the chronological transitions of the UoD and PCM SBME. The other sources of evidence such as documentary will be used to corroboratively link to the events mentioned. The findings and layouts of the logical connections can then be developed as a program-level logic model for evaluation.

After clarifying the overall strategy used for analysing the case study evidence, the following section presents the analytical techniques used. The technique is relevant when the study proposition is a complex chain of events which occur over an extended period of time.

The logic model technique is particularly useful in evaluating case studies (Yin, 2009). This technique is most relevant to the transformative innovation framework where a complex chain of events which occur over an extended period. The events occur in a continuous pattern, where the dependent variable (i.e., event) at a previous stage becomes the independent variable (i.e., causal event) for the next stage. This technique consists of matching empirically observed events to theoretically predicted events. This comparative case study intends to

evaluate the conceptual framework by observing interviews and organizational documents to see whether the designed stages produce the predicted outcomes.

The choice of logic model type is mainly related to the unit of analysis. In this case, the SBME implementation in a medical school represents the unit of analysis. Hence, the organisational logic model type has been selected because it primarily deals with events occurring in an individual organisation. Similarly, each case study in this research is tracing direct educational process events occurring in an organisation. The aim is to explore whether the conceptual framework improved the understanding of the implementation of the SBME teaching in both contexts.

3.8.3 Analytical Techniques Used

In line with the logic model technique approach outlined in the chapter (section 3.5), data were analysed using an iterative, layered process of coding. Coding is the assigning of labels to data to make sense of and to understand the meaning of dialogue. There is debate about the terminology and precise 'way' to conduct coding, but there is an understanding that it involves a movement from generating codes that stay close to the data to gradually generating more abstract ways of conceptualising the topics and issues at hand (Bryman, 2012; Glaser & Strauss, 2006; Kelle, 2005). In case study, approaches researchers stay close to patterns that they define in their data and treat them as categories. These patterns and relationships between categories develop during the iterative interpretation of the data (Yin, 2014a).

The coding process adopted in this research can be broken down into three steps, using a combination of both coding techniques outlined in Figure 3.4. The first step involved open or initial process coding (Charmaz, 2006; Saldana, 2009; Strauss & Corbin, 1998). This is a descriptive process that enables formulation of an initial, basic understanding about events or interactions by making implementation process categorisations of data, and to become familiar with the richness of the data recorded. As such, interviews that were recorded were transcribed and, along with documentation and notes, sections of text were assigned descriptive codes, to the point where individual lines had different basic codes to succinctly summarise and capture the meaning of the text. Through the 'slices of data' informed by

theoretical coding paradigms, Transformative Innovation and Normalisation Process Theory, the next process generated a multitude of different codes, was largely descriptive and required a degree of open-mindedness. This enabled some initial ideas to be considered and laid the foundation for a more analytical coding process to avoid drowning in the data and allow the 'emergence talk' between the data to take shape (Kelle, 2005).

The second aspect to coding is referred to as focused coding which has an inherent analytical element to it (Saldana, 2009). Initial categories not only coalesce as one interprets the collected data but also the categories become more theoretical because one engages in consecutive levels of analysis (Charmaz, 2006). The second aspect to coding is, therefore, much more iterative and fluid depending on the codes and themes that emerge and may require reviewing data in many ways. This focused coding is about developing the core categories and moving from the initial descriptive processual understanding to a more conceptual one. This involves reassembling the data by searching for connections between the variables that have emerged out of the coding (Bryman, 2012). It is for this reason that the process is iterative and only 'finishes' when theoretical saturation is reached (i.e., the point where no new themes or concepts that are central and relevant to the research emerge) (Bryman, 2012).

The third step is closely tied to the second coding process as it involves theoretical or selective coding. At this point, core categories and conceptual codes are developed and refined. Initial, focused and theoretical coding took place manually as opposed to digitally, which is an increasingly popular means of analysing qualitative data.

NVivo was used for supporting the data analysis. All UoD data could be input into NVivo as all of the encounters, interviews and organization documents in the Scottish medical school were digitally recorded and could be digitally transcribed. All recorded data and transcripts could easily be converted into an electronic format. Whereas the data obtained from the Thai medical school were conducted in Thai language. Translating some of the Thai material into a English format may result in loss of the originality and raw qualities (Nes et al., 2010). Consequently, manual coding was deemed the effective approach for all of the Thai transcripts and documents. For manual coding, Microsoft Word was used.

Figure 3.4 is a visual representation of how the coding process took place. This example refers to how the theoretical core category of 'SBME implementation and innovation' emerged from different qualitative datasets gathered from Scottish elites and experts and organisational documents at UoD. Beginning at the lower part of Figure 3.4 with initial or open coding, the analysis of transcripts and documents revealed that in relation to SBME, changes in the healthcare landscape resulted in changes in medical education. These changes valued an integrated and continuous outcome-based curriculum, along with consistency associated with learning outcomes as directed by GMC and SDMEG. Elites and experts referred to the shared value of SBME as a regular student-centered teaching tool for individual student progression. They also emphasised the importance of using assessments determined by the student's attributes. Taking these descriptions to a second more analytical level, focused coding indicated a shared understanding of spiral curriculum strategies and the needs of SBME. The UG curriculum tended to have a more continuous sequence to their understanding, indicating that the embeddedness of SBME is a tool for learning. At the theoretical level, each perspective refers to notions of SBME value and how each learning outcome is constructed towards the identified exit learning outcome. This serves as a core category that other analyses and codes revolve around (see Chapter 6).

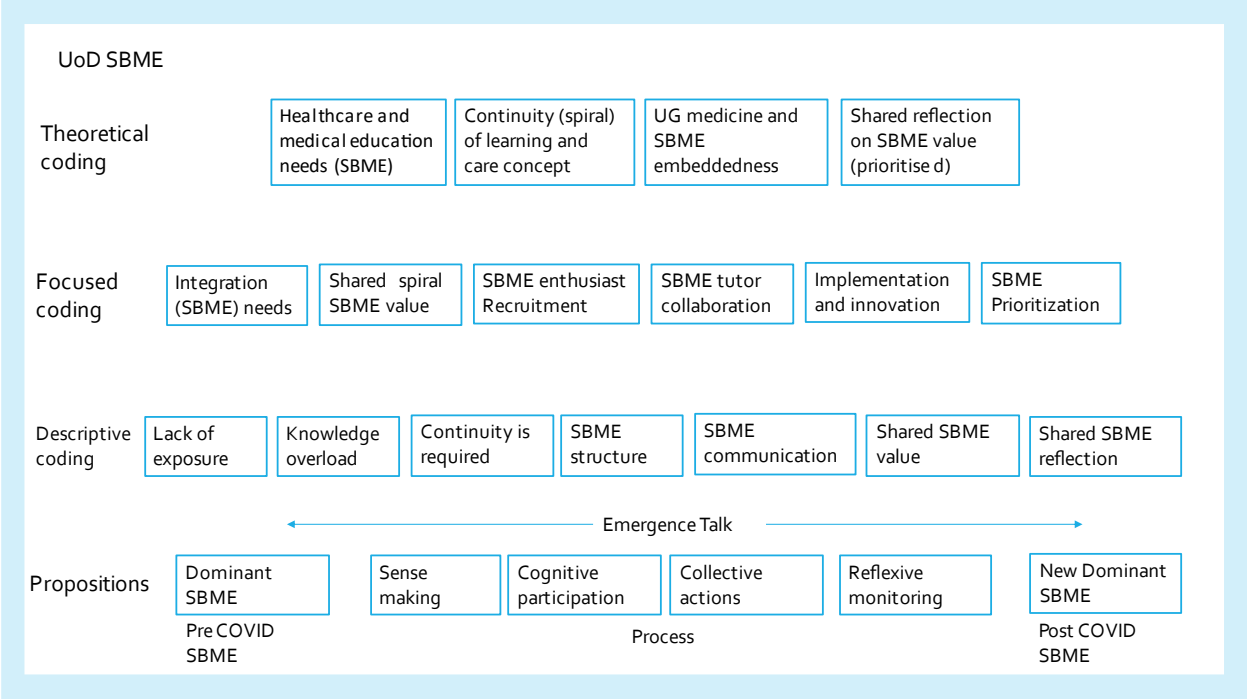


Figure 3.4: An Example of the Coding Process Using Thematic Analysis

This example does not fully demonstrate the iterative and occasionally complicated nature of the qualitative data analysis, as some categories could emerge from some of the data but can quickly go nowhere. This meant that data analysis can and did involve a lot of movement 'back and forth' across the raw material (Bryman, 2012; Charmaz, 2006). As such, Figure 3.4 is a simplistic, somewhat ideal representation of one example of data analysis in this research. However, it does serve to highlight how the progression from description to core, theoretical categories can emerge when there is a deep understanding within the data and a connection is established back to the research aims and objectives.

For the analysis in this research, theoretical saturation occurred when it became clear that participants were discussing the same issues and providing similar responses. Consequently, there was minimal or no presentation of 'new' information in comparison to the other collected data. By the time the number of interviewed SBME elites/experts had reached double figures in each country, the key issues regarding SBME implementation and innovation were becoming increasingly clear. This meant that core theoretical codes and categories, such as UG medicine

and SBME embeddedness as noted previously in Figure 3.4, could be substantiated using multiple sources of data, which is an indication of theoretical saturation. The results from this process are presented in Chapter 4 and 5.

'The generation of formal theory requires data collection in contrasting settings' (Bryman, 2012, P. 570). The comparative nature of this research enabled the exploration of both contextually specific and 'universal' elements pertaining to the informal socio-cultural and formal structural processes linked to SBME. This approach made it possible to gain a comprehensive understanding of the subject matter. A further important point regarding the final generation of concepts and logic models is that they can be either substantive or formal. Substantive refers to logic models generated in a certain empirical instance or context, such as a logic model about how SBME in Scotland affects outcome-based education curriculum strategies. A formal logic model, however, has wider applicability and can be applied to multiple instances or contexts, such as a theory about how SBME in both the global Western *and* Southeast affect outcome-based UG medical education strategies.

3.9 Reporting Case Studies

There is no single way to report case studies. However, it is important to identify a structure for the case studies. This is to ensure coherence as well as needs for the target audience (Yin, 2014c). The main target audience is academics and practitioners, especially educators and curriculum designers and innovators. While academics usually tend to focus on the relationships among the case studies, their findings and previous theory or research, course designers and educators may be interested in understanding how the implementation and innovation process of SBME is facilitated, and whether the findings are relevant to their practice. Therefore, the report should aim to serve both audiences. Importantly, the case study reports should attempt to be as descriptive as possible in order to target the non-educator audience as well. Case study research usefulness goes far beyond the research report, which is typically targeted at researchers rather than practitioners or a non-specialist audience. In fact, case study reports can communicate information about a phenomenon (e.g., SBME implementation process) to a variety of audiences such as non-educators and practitioners (Yin,

2014c). The format for writing the case study reports is based on the inputs and outputs of the conceptual framework constructs. This is aimed at facilitating the process for cross-case comparisons for both the researcher and the reader. This research adopts a linear-analytic structure, which begins by presenting the problem, and reviews the relevant literature. It then demonstrates how the SBME implementation and innovation are executed, and reports the findings and conclusions.

3.10 Implementation Research Ethics

This section first outlines the need and nature of research ethics, making the distinction between 'procedural ethics' (the planning phase) and 'ethics in practice' (the study phase). A central component to research ethics, informed consent, is then discussed with reference to a reflective account of qualitative data generation activities in both settings. This section then focuses on the importance of adapting to culturally appropriate practices and how dialogue between researchers and institutions can help to build understanding about the types of ethical practices that are effective *in place.*

Research ethics is an important aspect in the successful implementation of contemporary social science research and has grown hugely in importance in recent decades (Bryman, 2012). The purpose of ethics within qualitative social science research is to ensure that research is carried out in a professional, fair manner where concerns lie with ethical issues in relation to those who are voluntarily involved. This includes the understanding of what is required from them, for what research objective, and how involvement may affect them. It is important for researchers to behave ethically and conform to official guidelines because this protects the rights of those affected, assures a climate for conducting the study, gains and maintains mutual trust and ensures accountability (BERA, 2018; Bryman, 2012). Yet the notion of ethics encompasses a range of discourses, which means understanding what it is 'to be ethical' or to 'behave ethically', needs consideration.

For the purposes of qualitative research, Jeanes (2017) argued that there are two dimensions of ethics, 'procedural ethics' and 'personal ethics'. The former relates to gaining approval from an

appropriate ethics committee, whereas 'ethics in practice' concerns the everyday ethical issues that arise in the 'conducting' of research. Procedural ethics can be understood as the initial planning phase identifying issues that are likely to arise during the research and outlining how these will be eased. Gaining institutional approval for the research to go ahead is the focus for that stage, and is premised on notions of protection, confidentiality, anonymity, justice and respect (Jeanes, 2017). Names of participants will be disguised by codes. This research work follows both medical schools' codes. Ethical permissions for this study were granted by Ethical Approval committees for the Scottish and Thai contexts (see permission and ethical approval letters in Appendix 4). Permission to access documentation and speak to staff was granted in both contexts by the UoD the Head of Undergraduate Education and the PCM Dean and Phramongkutklao Hospital Director.

3.11 Informed Consent

Informed consent is an integral part of contemporary research ethics as it relates to research participants agreeing to take part in research activity. There are four criteria which must be met for consent to be legitimately sound (Edwards 2010). Firstly, the participants must have sufficient information for their decision-making process. Secondly, they must have mental capacity to make that choice at the time of giving consent. Thirdly, they must be free from coercion or pressure, and fourth, a final decision must be made with intention (Edwards 2010).

Meeting these criteria and the process of obtaining informed consent is incorporated into procedural ethics, whereby the researcher explains to the relevant committee about the methods to be used for gaining participants' consent. It is particularly common amongst medical institutions to use either printed or electronic document as the means to gain consent. Informed consent forms (see Appendix 5) designed for organisational members and SBME tutors in both the Scottish and Thai medical schools were created. The reasons for this are that the form (and accompanying participant information sheet, see Appendix 6) provided succinct detail about the research project and what participation involved. This type of communication and consent procedure is common within medical education organisations.

Indeed, the semi-structured interviews with Thai SBME elites and experts within PCM were conducted in 'culturally familiar' spaces and with people in professions who are familiar with such formal discussions about consent. Similarly, participants at the Scottish medical school also understood the purpose of research ethics and the process behind formal consent procedures. This meant that conducting case studies were relatively straight-forward both in Scotland and in the 'culturally familiar' professional arena in Thailand. Informed consent via a signature on a pre-prepared, approved form was obtained as the participants understood the content of the form and why it was being used.

Gaining informed consent remotely during the COVID-19 pandemic unfolded differently in Scotland and Thailand, and this required reflexivity to prevent any unnecessary 'awkwardness' or breakdown in rapport between the researcher and the participants. There was an issue of social and cultural appropriateness, as this method of informed consent may not be readily understood, recognised or even known amongst various groups of people or cultures (BERA, 2018). The Thai participants may reveal organisational culture related issues, such as power relationships, either of themselves or others, which may contain potentially sensitive topics. The researcher made his researcher role explicit at the beginning. In the unlikely event where there is any concerns of a significant risk of harm to self or others (e.g., patients and students), the issue was raised as an important issue be discussed with the supervisory team in the first instance and then referred appropriately depending on the issue.

Moreover, the researcher personally met and established relationship with elite from both medical schools who also acted as a gatekeeper. This gave greater access to participants and meant rapport was easier to maintain from the beginning of encounters, most of which were unannounced. The importance of being flexible and employing interviews and documents observation was magnified. While the elites gave initial access, the prominent status the elites held amongst participants often required the researcher to take the backseat for politically or culturally controversial issues (BERA, 2018). It could therefore be argued that the flexibility demonstrated here affected the researcher's presence as well as the process of data generation

in the culturally unfamiliar settings of the Scottish medical school and the 'culturally familiar' spaces of the Thai medical school (Irwin, 2013).

As such, greater emphasis was placed on adhering to cultural norms when it came to research and informed consent in the 'culturally unfamiliar' education locales (Manzon, 2014). Mobilising the established, respected elite, who also serve as gatekeepers, to gain a degree of consent by proxy from participants rather than just gaining access to them, was a particularly useful approach. This is because Eastern cultures generally value group consensus and the needs of communities. Indeed, "an individual-based consent model and the use of written consent documents may be problematic in countries where norms of decision-making do emphasize individual autonomy" (Tindana et al. 2006: P. 1). This was taken into account before and during fieldwork in the 'culturally unfamiliar' spaces of Scotland, ensuring that the research process was contextually appropriate and ethical. In the 'culturally familiar' spaces of Thailand, the written consent documents may not be challenging.

3.12 Translation Considerations

The objective of this section is to outline the translation considerations in this cross-cultural/cross-language qualitative research study. I reflect on my reviews and my experiences of conducting cross-language qualitative research and examine how my translation techniques shape the data collection and interpretation of non-English to English language transcripts and qualitative data. The following coalesce to inform how the translation is addressed: the processes and outcomes of translating, the importance of situating data in its context, how this shapes the representation of data and the timing of translation.

The basis of a qualitative approach is emphasis on the process of discovery from the understanding of how social interactions are created and given meaning. The use of language is then a primary source in studying how meaning is made through subjective experiences as it can be used to express meaning and explain how meaning is constructed (Goitom, 2020). The interviews, either face-to-face or via audiovisual over the internet protocol (AVOIP), are the primary means of data collection employed as they provide the participants with an

opportunity to generate spoken interactions of their lived experiences. As a result, I assume multiple roles as an inclusive researcher, translator and researcher, who can speak the language of my research participants (Thai and English). I processed the translations, transcriptions and interpretations without the assistance of a translator. This is because, first, in the Thai context, it is challenging, unlike other languages, to find an experienced medical education translator who understands and can translate 'medical education' discussions without affecting the quality of the data. Secondly, in the Thai context, working with the translators who are from the same community of practice as the participants poses ethical challenges as it would risk exposing the identity of the participants.

Despite having fluency in both Thai and English, I face challenges as a non-native English speaker, particularly to address how I translate Thai speech into English. Language constitutes a challenge because it has a variety of local mutually dialectical variations with differences in pronunciation, vocabulary and grammar (Goitom, 2020). Thai is a very morphological language; additional layers of complexity are added to one's ability to translate and interpret. The act of translating into English can be hindering because it can take away part of meanings presented by the participants as they narrate in Thai. For instance, there are some words in Thai that do not have the exact meaning in English. Additionally, translation is not only about a text but also a function of communication across cultures which require cultural insight in order to be understood and translated appropriately into English. I applied the collaborative process of translation and back-translation between the speaker and the translator during the interview process (Nes et al., 2010), writing down Thai words used by participants and their corresponding meaning as I understand them.

Translating Thai into English in an attempt to make it understandable for academic readers requires conducting the translation in a grammatically correct written format. I myself belong to the same country of origin as the Thai participants. Therefore, contexts are not foreign to me to explain the context. Simultaneously, although I may be familiar with the challenges, I cannot claim to be a complete 'insider' as I have been outside the PCM institute for over four years. Although having a member of the research team as a translator is said to strength the rigour

and trustworthiness of the cross-language study, Berman & Tyyskä (2011) reported that the perspectives of the translator need to be taken into account as the languages are not neutral. Taking this into account, taking back the translated work to verify their 'factual' meanings means examining the text for bias and taking care to ensure the text is participant driven.

3.12.1 Data Representation

My concern is to ensure that I am translating the language that represents the participants' construction of their narratives and their medical education cultures as accurately as possible. The choices and decisions made during the translation process impact on analysis and interpretation as they are fundamental to the qualitative research. They are driven by the language differences producing difficulties, hindering the transfer of meaning and might result in loss of meaning which affects the validity of the study (van Nes et al., 2010).

Establishing equivalency then becomes an issue of how to assure validity in data meaning/representation (Goitom, 2020). I secured validity in terms of the meaning through 'semantic' equivalency and 'content' equivalency to ensure that once translated, the meanings are similar and that what has been constructed holds relevance and similar meanings in both contexts (Regmi et al., 2010). The processes of transcribing participants' spoken words into texts is not about putting events on paper. It is about being able to translate the shared meaning and culture imbedded in the language used in a particular community of practice in the purpose of analysis and generating meaning (Heizmann, 2009). Thus, my concern has always been to ensure that I understand the language used by participants accurately, particularly in their construction of SBME implementation and their associated meanings.

To comprehend the Scottish contexts, the interviews were conducted in English. Although I had an outsider position in the UoD context, participants and I shared a common medical education language, and that accommodated the discussion of SBME in the Scottish context. I engaged my participants in interview to gain their perspectives on what SBME means to them and the purpose it serves to explore the implementation of SBME teaching and concepts they referred to. I presented the transcriptions back to the Scottish participants who agreed to review them for accuracy and confirm their satisfaction (McNiff & Whitehead, 2000).

To understand the Thai SBME contexts, the interviews were conducted in Thai. In accordance with this approach, my technique in addressing issues regarding translating and representing data has been to search and research by asking questions concerning SBME and its implementation. Keeping in mind that 'a research account looks for patterns, narrative threads, understandings either within or across individuals' personal experiences', the most challenging aspect of this process was presenting the translated narratives (excerpts in Thai and English) back to the Thai participant for their review and assessment of the translated interpretations in terms of 'accuracy'(Santos & Sandelowski, 2015). I also kept an audit trail of my translation to ensure my translation transparency (van Nes et al., 2010). What I found helpful during the study data collection phase were the relationships built with participants and taking time to help them understand the project aims. In addition, offering them to speak in their own first language providing them time for the data collection phase ensured that the interviews were not rushed, but allowed time for clarification when needed.

3.12.2 My Role in Translation and Analysis

It is undeniable that there is some loss of information in the act of translating Therefore the process by which I made sense of what is interpreted is important. To mitigate this loss as much as possible, participants are invited to review parts of the interviews, the transcripts and the translations of their experiences. When doing this, the translations are often almost accurate because the participants' teaching experiences and activities are foregrounded in the meanings that they were trying to convey which are tied to local realities (Hofstede, 1986). As a result of being the sole person who had access to all the narratives (data), the process required that I continuously looked for threads and emerging talks in the data to help me better understand the participants' stories and how I can situate them in the context of the overall study. Therefore, I was constantly thinking about participants' medical education accounts and cultural meanings which the language was conveying, and evaluating the degree to which the two cases are comparable. This complex process also required reflexivity and critical thinking. It was a process of developing an understanding about how the participants made sense of SBME experiences and their process of implementation and innovation and how it informs UG medicine and teaching practice.

3.13 Summary

This chapter has detailed the methodological aspects of the research. The philosophical foundations of the research have been outlined. The study is underpinned by an interpretivist epistemology. The adopted case study approach explores the cases of SBME innovation in Scotland and Thailand. It is important to note that these cases are not chosen as representative of SBME in the Western Europe and Southeast Asia, but because an in-depth understanding of the SBME can be gained through analysis of each case and when contrasted with one another. By researching the medical education assets of SBME users (i.e., educators, elites and experts) in both Scotland and Thailand, a greater understanding of how SBME relates to their outcome-based UG medical education strategies can be gained. Moreover, the commonalities as well as differences in both countries can be revealed.

This research uses a range of methods and techniques. Firstly, a qualitative approach to data collection was selected due to the nature of the research questions and philosophy. The main technique used to generate data was semi-structured interviewing complemented by collection and analysis of documents related to curricula and teaching. The comparative case study as an overriding methodological means to approach data collection has also been used. This has enabled the research to evolve in context whilst retaining a rigorous approach.

This chapter has outlined and identified the reasons for selecting the case studies as well as the way that the research has been conducted. A reflective discussion about ethical research and informed consent has also highlighted some of the issues of conducting qualitative research in cross-cultural contexts. The analysis which follows is presented in two results chapters. It is to the results that the narrative now turns, starting with the Scottish and then Thai findings.

Chapter 4: Understanding Simulation-Based Medical Education and Implementation and Innovation through Covid at the University of Dundee

4.1 Introduction

This chapter presents case study data gathered to illuminate Simulation Based Medical Education (SBME) implementation and innovation using a Transformative innovation framework (TI) and Normalisation Process Theory (NPT). The chapter has two analytical foci: 1) a case study report using TI to investigate history, development and change (section 4.3) and 2) embedding of SBME through NPT (section 4.4). The first focus explores the implementation of SBME, aiming to understand SBME processes both pre- and during the COVID-19 pandemic. The approach adopts logic model reporting as a cause-effect-cause-effect structure as seen through TI. The purpose of using two theoretical frameworks is to provide a deep understanding and effective platform for cross-case analysis in Chapter 6. Section 4.3 uses the logic framework related to TI to link the pre- and during COVID-19 utilisation and development of SBME. Finally, section 4.4 of this chapter interrogates implementation and development using NPT constructs and dissects the study propositions to expose the implementation processes. The chapter commences with a brief introduction to the UoD SBME practice context and provides a wider overview of healthcare and medical education in which the SBME is situated.

4.2 University of Dundee Medical School Case Study Report

This chapter presents the interviews and documentary datasets used to provide a brief history of the medical school and the curriculum. This was framed by the study propositions used to expose and understand SBME implementation processes.

4.2.1 Context

Undergraduate (UG) medical educators constantly seek new strategies to achieve exit learning outcomes and increase teaching effectiveness. SBME offers valuable teaching tools linking the theory and practice (Purva et al., 2016). As discussed in Section 2.5.2, there were three components involved in SBME: Task (learning outcome), Person (process) and Context (Centre)

(Dieckmann & Ringsted, 2013). Dieckmann & Ringsted (2013) suggest that these three related dimensions and the conceptualization of outcome construction are more apparent in SBME. SBME are commonly utilised to deliver teaching in a face-to-face mode to achieve medical education learning outcomes and offer the advantage of supporting direct, in person interactions between peers, with colleagues and with tutors. However, this advantage was lost over the pandemic due to the requirement for social distancing in medical schools which led to a low face-to-face contact and a struggle to maintain personal social interactions (Arandjelovic et al., 2020). The analysis of data focused on transformative innovation pre- and in the time of COVID-19 aimed, in part, to understand the positive or negative impact of the requirement for social distancing on practice and innovation.

4.2.2 The History of the Medical School and an Overview of UG Medicine Structure

The University of Dundee Medical School (UoD) is a Scottish medical school located in the East of Scotland. UK. However, it develops students for the wider UK and international workforce. UoD supports medical education through teaching a broad range of knowledge and developing skills as well as professional attitudes in both classroom and clinical practice (Scottish Deans' Medical Education Group, 2008). UoD (formerly University College Dundee) Medical School was initially conceived in the 1880s and established as a Faculty of the University of St. Andrews (Dundee Medical School, 2008). Later in 1967, the University of Dundee Medical School separated from St Andrews and was constituted as an award giving institution in its own right. The physical 'embedding' and 'integration' of the medical school in the Ninewells Teaching Hospital was a strategic feature when it opened in 1974 and provided a collaborative network of university and NHS staff in close proximity. The current undergraduate medical student intake is over 200 students per year, with the pressure from the government to further increase it.

A further feature of the UoD undergraduate medical programme is its commitment to integrated and spiral curriculum, within which SBME opportunities are present across all five years of the programme. These SBME experiences are largely supported, delivered and assessed within a bespoke clinical skills (simulation) centre. The curriculum delivers integrated

clinical learning for the undergraduate medicine across five years by linking three dimensions of the work of the doctor scholar, and scientist and practitioner, and associated outcomes described by the GMC in Tomorrow's Doctors. Similar approaches to using SBME exist in other medical schools in the UK for examples Liverpool and Glasgow which are in England and Scotland respectively. However, Dundee has been a leading innovator in this area (Bradley & Bligh, 1999; Davis, 2003; Shumway, JM. Harden, 2003; Stirling et al., 2012).

Investigation of the use and development of SBME was achieved through an organizational document analysis and a series of interviews with different educators (section 3.7). Figure 4.1 below maps the roles of the elite and expert interviewees and the insights they could offer on different parts of the curriculum in the first and the second phase of the interview rounds. The majority of the respondents had oversight of SBME over the whole undergraduate curriculum. SBME elite and expert interviewees were selected for this study for the privileged scope and focus they had in terms of resource management and support and delivery of SBME at different stages of the student's progression. The rich picture of SBME practice achieved through these interviews enables comparability between SBME training delivered prior to and during the COVID-19 pandemic.

Figure 4.2 depicts how the undergraduate curriculum is split into two main divisions, Systems in Practice (SiP) and Preparation in Practice (PiP). SBME opportunities focus on an organ systems approach in SiP which enables students to learn in a variety of clinical learning sessions prior to the PiP (core clinical placements) stage. This systematic approach builds a community of practice across medical education and healthcare services, connecting and strengthening the opportunity for highly clinically relevant teaching by practicing clinicians. SBME is structured around an outcome-based model of medical education. SBME across the five years increases in complexity as the higher level, multi-faceted outcomes are required.

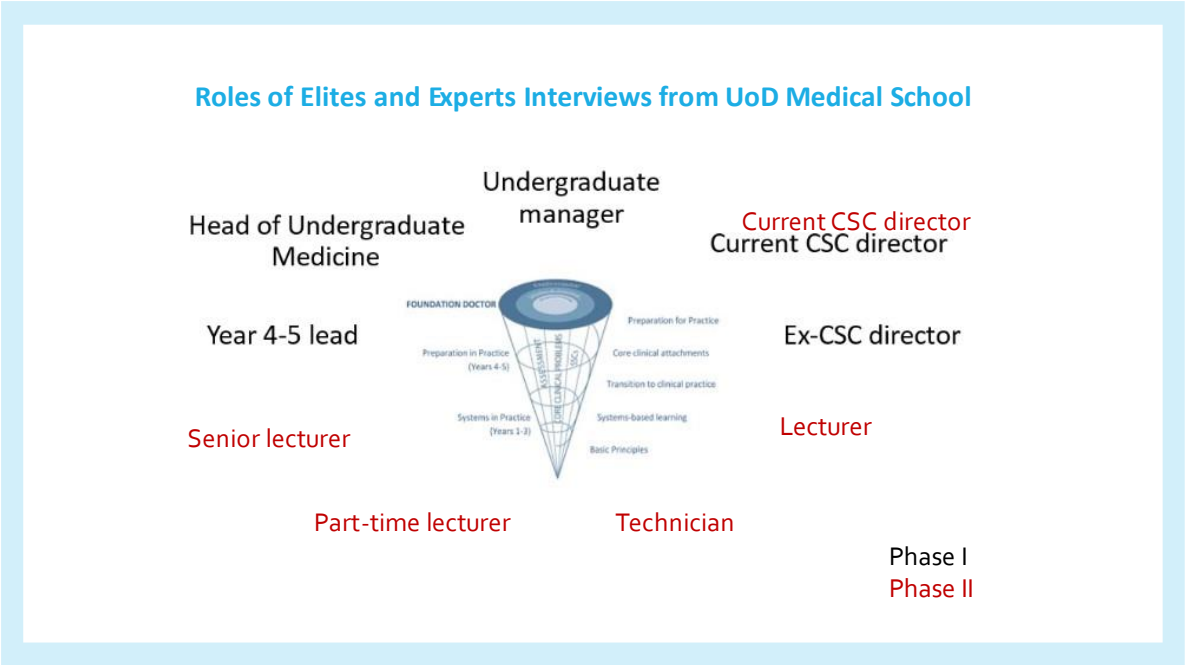


Figure 4.1: Roles of Elites and Experts Interviewed in the UoD In-depth Interviews (Pre-COVID in black/Post-covid in Red)

Source: Medical School Undergraduate Office (2014)

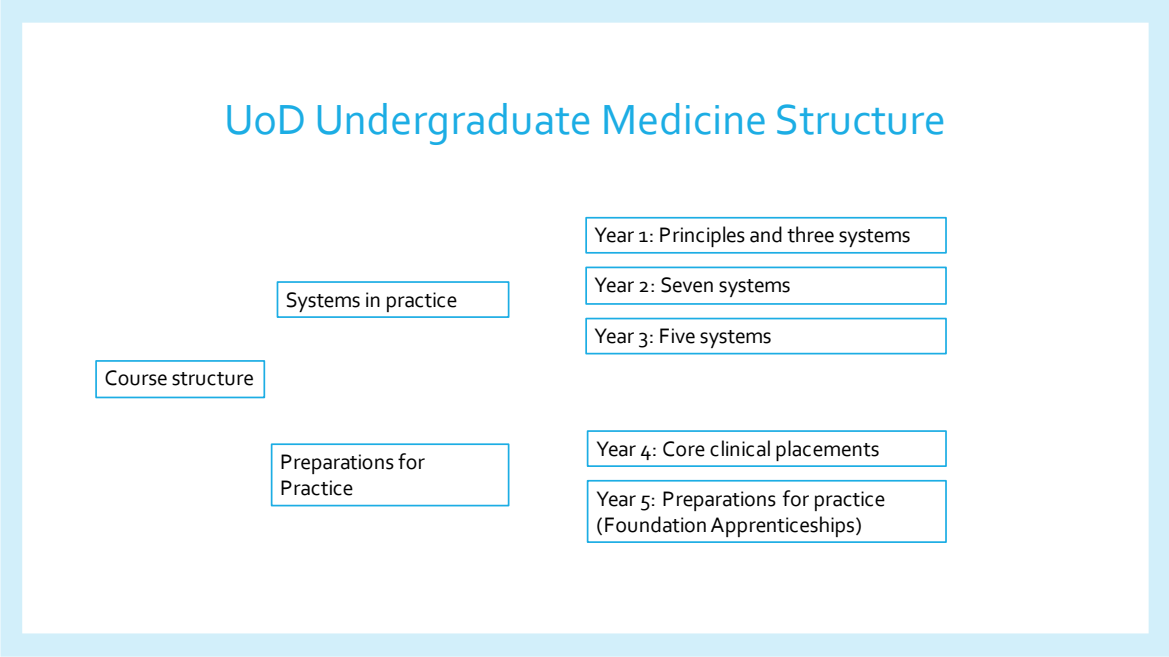


Figure 4.2: Broad Course Structure of Undergraduate Curriculum
Source: Medical School Undergraduate Office (2014)

There is an increased complexity in the systems teaching and associated SBME sessions across the curriculum, starting with simple procedural simulations and culminating in a complex, multi-faceted ward simulation (see the lists of SBME used in the current UG curriculum in Figure 4.3). Teaching in each system is structured around core clinical problems and is supported by (online) study guides (Medical School Undergraduate Office, 2014).

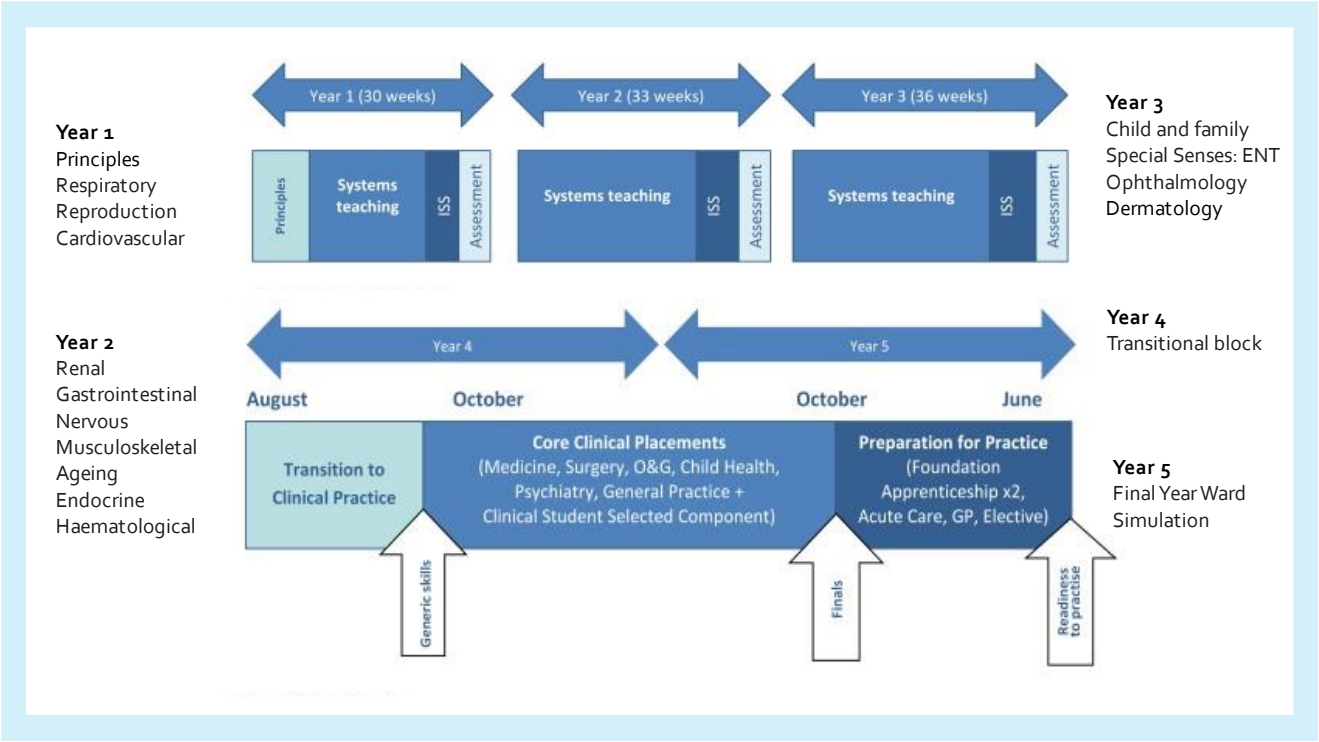


Figure 4.3: Areas of SBME Activities in the Current Curriculum
Source: Medical School Undergraduate Office (2014)

In addition, SBME teaching support has a physical presence, using a bespoke clinical skills centre as another way to interactively communicate with existing and potential members in training. The centre also serves as a space for the medical school to showcase their progression in medical education and to interact with prospective tutors or students who may be interested and enthusiastic in the SBME. The clinical skills centre is also based within close proximity to the hospital estate conferring advantages for clinician engagement in teaching.

4.3 SBME Transformative Innovation in UoD Undergraduate Medicine

The transformative innovation process defined by Leicester (2016) is adapted and offered in a visual format in Figure 4.4. While each step and factor were examined, the relationships between elements were drawn out from both interviews and organisational documents. The innovation was visualised in the evaluation process of the Dundee SBME implementation, including changes in structure and organisation of SBME. Specifically, it indicates the links between occurrences prior to and during Covid and the shift between 'Horizons'. Each transformative horizon reflects how impact of change promotes a rethinking of SBME execution. However, the link between different stages of SBME implementation is not limited to a simple causal link but rather is an iterative process, where tutors refer to the previous period practices and processes to inform innovative progress (see Figure 4.4).

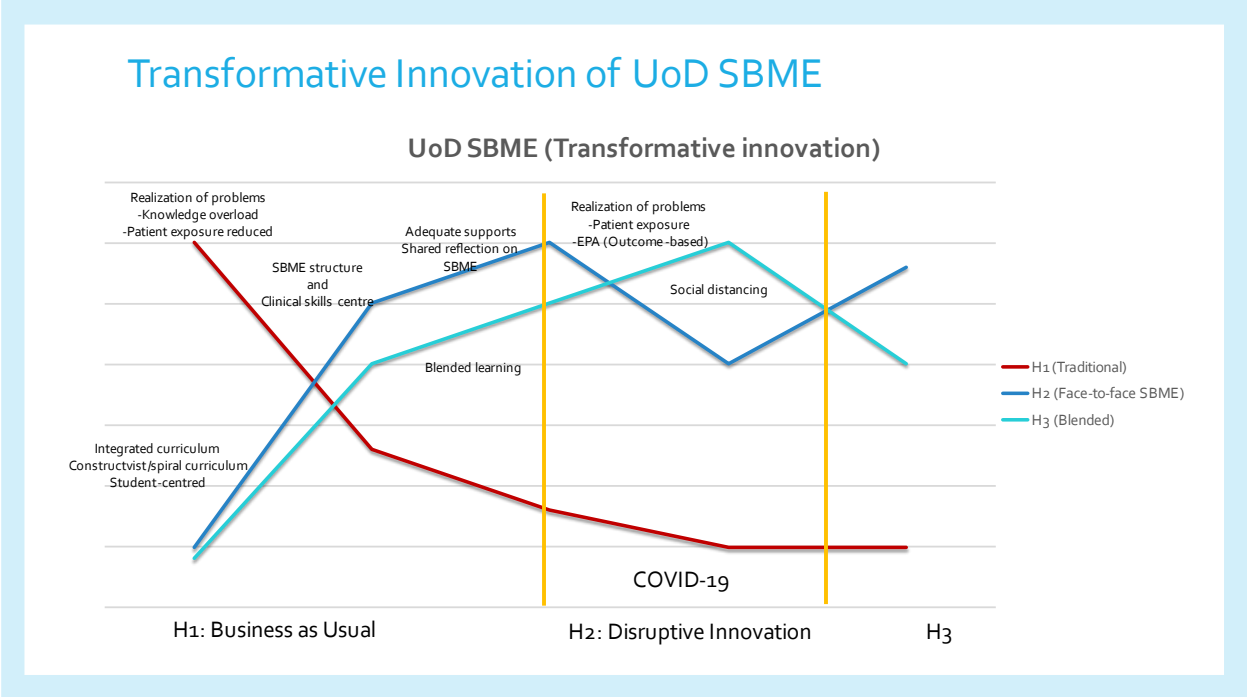


Figure 4.4: Visual Presentation of UoD SBME Implementation Utilising the Transformative Innovation Model (Leicester 2016).

The three horizons framework offers insights into the process of undergraduate medicine and SBME changes. The process of UoD SBME implementation can be described through three

patterns of activities and the way in which reimagining SBME and practical actions play out over time.

The first horizon – H1 A more formal SBME pedagogy developed in Dundee was founded on the requirements of an integrated curriculum following the withdrawal of a more traditional pre-clinical science/clinical approach in 1993. The integrated curriculum approach adopted involved system convenors, responsible for linking and supporting learning to deliver required outcomes at different stages of the undergraduate curriculum. Some of the challenges associated with the adopted curricular approach were identified in interviews.

> *"...one of the challenges we had here at the University of Dundee was that the consequences of that integrated curriculum mandate, and students had to be exposed to patients from an early stage." (Int Ref UoD1_4)*

> *"...and we didn't think we had the patient population to provide that sort of experience for our students in the way that the General Medical Council had envisaged. And so we thought that one of the ways in which we could address that was to have skills and simulation centre where we could prepare students for their clinical attachments so that it gave us an opportunity to really develop a prepared novice for a practice." (Int Ref UoD1_4)*

SBME pedagogy was then embedded and normalised in undergraduate medicine by linking tutors with students and the curriculum via what Issenberg et al. (2003) referred to as 'simulation' given the role of the intermediary between tutors and students. Dundee SBME's core principles helped facilitate both technical and non-technical skills development throughout five years. SBME tutors use SBME pedagogies to develop undergraduate medical students' knowledge integration and skills development 'before' encountering real patients.

> *"we want to make sure that students are getting the opportunity to practice and role play situations before they're trying to do it in real life." (Int Ref UoD1_1)*

Unlike in traditional curricula, SBME pedagogies can utilise attributes associated with undergraduate medicine, such as learning outcomes and exit learning outcomes. This is an advantage over clinical teaching in traditional curriculum models which may take a more commodified approach to undergraduate medicine pedagogies rather than making an overt connection with healthcare needs as is the case with SBME teaching.

> *"…real drivers for simulation, they were real needs within our context. Uh, so patient safety was a big agenda. So great. We've got the right. Yeah. So GMC government piece of sectors, agenda great and fits with that. Increased pressure on service, less service, less ability for students to learn just all the regular wards that was happening." (Int Ref UoD1_2)*

As part of the undergraduate curriculum and the medical school, the clinical skills centre, as the previous quote indicates, provides SBME teaching support~~s~~ and spaces where tutors and students come together to teach and learn clinical skills in a safer environment, establishing and developing the foundations of competent and reflective practitioners. The clinical skills centre also provides support workshops to help other allied health professions with their practical and teaching skills development offering opportunities for interprofessional education. This serves to increase opportunities available to students and trainees to improve their skills and strengthen the quality of more integrated care and respond to demands or issues in clinical practice, as the following quote illustrates,

> *"...we're lucky to have them, who can come and teach their skills to people and clinical skills as well as the undergraduate. They also do simulation exercises for postgraduate. So they'll they do optometry, but they also do work with doctors who're in trouble. People have been identified as being at risk and we've got clinical practice not up to scratch." (Int Ref UoD1_4)*

Establishing 'relations of trust' and 'engagement' that are founded in direct relationships between tutors and students is important for SBME implementation strategies. It is this aspect of 'relationship' that distinguishes SBME from other non-traditional teachings. As such, the

relations between tutors and students are a key part of the SBME and student-centred approach, creating enhanced opportunity for supported self-reflection amongst individual students and for feedback given directly by tutors. SBME can, therefore, be recognised for the tutor-student relationship, enabling support and interventions, that sometimes extend beyond curricular needs as shown in the following example.

> *"I remember one student to had, um, developed, um, really, uh, quite worrying eating habits and her, her, her fellow students came to see me because they were really worried about her and wanted to engage with the pastoral stuff system within the medical school. And I didn't know how to do that. And that was in first year. And I always thought, well that was actually, a real compliment to us because they felt safe." (Int Ref UoD1_4)*

The 'tutor-SBME' relationships have not received as much attention as 'tutor-student' relationships within recent medical education. As noted in the interview excerpt, it plays an important role in delivery of student-centred SBME and provide an opportunity for constructive feedback to students. Indeed, the trust and engagement for one another is an important differentiating characteristic from other types of teaching and feedback loops that either occur on a larger scale or become normalised,

> *"… in a simulation centre, you, you've really got to make sure that every single person has the opportunity to, to learn and practice and to use part task trainers or models as, as is appropriate and to give the students that have some feedback." (Int Ref UoD1_4)*

As a result of spiral curriculum embeddedness (normalisation), there is an increased complexity in the systematic SBME teaching sessions across the curriculum ranging from a simple-procedural simulations to a complex, integrated ward simulation (see Table 4.1 for exemplar questions asked in the SBME). Teaching in each system is structured around core clinical problems, constructively aligned towards identified exit outcomes, and is supported by (online delivered) study guides (see how the sessions are aligned in Table 4.1) (Medical School

Undergraduate Office, 2014). SBME teaching for a particular week is also structured around a clinical example of the week topic. Each of these scenarios has a set of learning outcomes that are designed to enable students to identify their learning opportunities and aspects which should be revised or improved in order to move to the next level.

Table 4.1: SBME Constructive Alignment across Five Years

Year	Context and Learning outcomes
1	You are a medical student on the acute medical ward. Task: - Take a focused history. You are not required to examine the patient. - After taking the history you will be given an ECG which you should report to the examiner.
2	You are a medical student seeing a patient in General Practice. Task: - Take a history - Discuss the possible diagnosis, further investigations and management with the patient.
3 (Haematology block)	You are a medical student attached to the haematology block Task: - Demonstrate general examination with haematological focus - Demonstrate examination of liver and spleen - Demonstrate lymph node examination and recognise/describe lymphadenopathy - Demonstrate correct and safe procedure for venepuncture and cross-match - Demonstrate a structured ABCDE approach to managing a transfusion reaction
4	You are a medical student attached to the acute care block Task - Recognise acute care conditions - Initiate initial management -administered by senior nurse in absence of medical prescriber, guided by British Thoracic Society guidelines - Identify when and who to call for senior/expert help, escalation using SBAR - Discuss immediate investigations and treatment plan
5 (Final Year Ward Simulation)	You are to act as a foundation year doctor attending the ward. Task: - Demonstrate receiving and evaluating a handover of patient care - Demonstrate tasks prioritization - Demonstrate appropriate prescribing practices - Take responsibility for initial assessment and management of unwell adult - Participate in multidisciplinary working practices - Discuss complex scenarios with seniors - Hand back patient care to senior colleagues

Source: Document analysis (Study guides)

H2 (the second horizon) - The format and embeddedness of the spiral curriculum has demonstrated its effectiveness in its resilience during the pandemic situation. The 'capture and

extension' scenario described by Leicester, 2016) was found as an explanation for the UoD SBME implementation (Leicester, 2016). The integrated and spiral curriculum strategies adopted have been mainstreamed and maintained even in a world where social distancing became the norm. As the nature of the tensions and dilemmas seemed to be similar to what happened to the healthcare and medical education system with reduced social interactions prior to the pandemic, SBME was then extended as blended SBME. The UoD blended SBME implementation, therefore, seem to have succeeded in adapting to the ways of working during COVID-19 and did not much require the subtle processes of change, capacities, and structures to navigate the transition.

H3, as the third horizon vision at UoD, has grown from the activity in response to medical education problems in the past. It introduces new effective ways of delivering UG teaching which turn out to be much better fitted to the problems in relation to COVID-19 disruption (reduced interactions and patient encounters) which are emerging as in the H1 systems. At UoD, the spiral SBME curriculum and the tutors, therefore, emerge as the 'champions' enabling and mobilising transformative innovation through the changes (Sutch et al., 2008).

The following sections provide the patterns of relationships that enables UoD spiral curriculum to adapt through Horizon 1-Horizon 3. The sections also identify the nature of UoD SBME environments and the process of change during the transition that displays resilience in the system.

4.3.1 H1: UoD SBME – New Business as Usual

When exploring SBME as an outcome-based education strategy, making a distinction between pre- (dependent on healthcare and medical education system) (Doc Ref 1-42) and post-Covid-19 (dependent on social distancing) (Doc Ref 43-93) led to the understanding of what are the healthcare and medical education factors involved and how they are linked to and affected by required changes. SBME implementation factors are examined and the relationships between them are drawn out in the descriptions of the changes to the Dundee undergraduate curriculum which have occurred as a result. They establish the emergence of approach which

has had a lasting influence on medical education in Scotland and the UK. Key components of the Dundee spiral curriculum approach to SBME and medical education are made explicit in Figure 4.5.

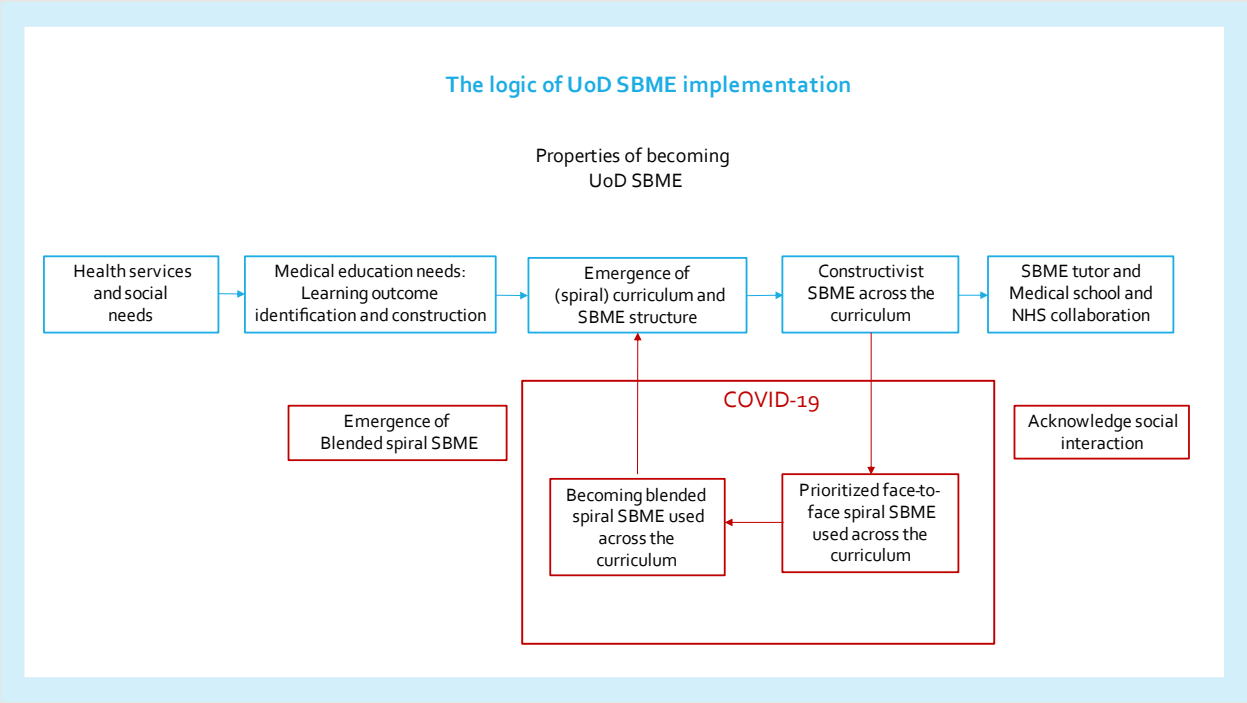


Figure 4.5: The Logic of UoD SBME Implementation

Changes, such as increasing numbers of trainees, working time restrictions and shorter duration of training, have reduced opportunities for medical students' clinical experiences and resulted in service dissatisfaction with their clinical skills (Bligh, 1995; Bradley & Bligh, 1999; Walker, 1991). These deficiencies in a range of development skills in the training have been recognised as a result of changes in healthcare service (Bradley, 2006; Dacre et al., 1996). Curriculum integration and early exposure to clinical skills have become commonly accepted as important educational goals in response to the change of healthcare needs (Bligh, 1995; Ledingham & Harden, 1998). In the UK, the recognition of the need for better prepared, competent doctors with appropriate skills and attitudes were captured in the 1993 GMC recommendations (Dacre et al., 1996; General Medical Council, 1993). Dundee is among one of the medical schools

incorporating clinical skills units into its undergraduate programme (Bligh, 1995; The Scottish Deans' Medical Curriculum Group, 2000).

The GMC recommendations require medical schools to introduce systematic approaches to educating medical students through SBME and offer support for learners and educators in utilising SBME. The concept of SBME began with 'GMC recommendations' (Harden, Davis, & Crosby, 1997; Rubin & Franchi-Christopher, 2002), which are commonly referred to, in reference to the report, as 'Tomorrow's Doctors'. The report was generated through medical schools and extensive public and professional bodies consultation to ensure that medical graduates met adequate clinical standards. Complementing the GMC proposals, the Scottish Deans' Medical Curriculum Group focused on defining and explaining 'learning outcomes' for undergraduate medicine which formed the foundation for curriculum reform (Scotish Deans' Medical Curriculum Group, 2008).

The idea of outcome-based education recurs in other policy documents used at UoD and across the UK, such as the 2013 "Good Medical Practice" which highlights the GMC's commitment to "outcome-based education" (General Medical Council, 2013). Outcome-based education is developed in the GMC's most recent policy document "Outcomes for Graduates 2018" (General Medical Council, 2018) in which its ongoing commitment to the idea is presented in the context of improving the quality of medical education linked to supporting continuity of care and patient involvement and achieving GMC's good medical practice (General Medical Council & Medical School Council, 2016):

> *"This guidance shows how the principles and values of the GMC's core guidance for doctors, Good medical practice, apply to you as a student. Understanding how the core guidance for doctors applies now and in your career will help you be a good student and, in the future, a good doctor." (General Medical Council & Medical School Council, 2016)*

Whilst the GMC report emphasised SBME as part of 'outcome-based medical education', the Association for Simulated Practice in Healthcare (ASPiH) supported the recognition of SBME and

its needs for physician training. Association for Simulated Practice in Healthcare (2016) provides a key step in developing and improving quality SBME as each professional body has its own requirements for education, training and patient safety. It shows that these professional bodies have an influence on better SBME delivery. One of the interviewees reported how these organisations' recommendations are dedicated to the use of SBME:

> *"the GMC would say, how do you standardise, how do you ensure that people are being examined to the same standard. And a lot of that is around the approach that we have to our OSCE and the clinical skills and clinical skills staff development there from their training." (Int Ref UoD1_3)*

A number of themes, demonstrating the healthcare and medical education factors that emerged from the data, are presented in Table 4.2 below. Sub-themes are used to explain how they are intertwined and contribute to the implementation of SBME in Scottish medical school context.

Table 4.2: Themes and Sub-themes Identified for Pre-COVID-19 SBME and Broad Definitions

Themes	Sub-themes	Explanation
Emergence of Healthcare problems	Simulated clinical experience is a solution	This theme highlights the emergence of SBME from an integrated curriculum need.
	Linking with Local Medical Practice	
Medical Education Needs	Outcome Identification	This theme highlights the emergence of an outcome-based and a spiral curriculum.
	Outcome construction	
Emergence of SBME	SBME structure	This theme highlights the emergence of enacted spiral SBME curriculum strategy.
	Clinical Skills Centre	
New dominant teaching practice	Student-centred and structure	This theme revolves around the idea that student-centredness has influenced the quality of SBME and the roles that constructive alignment plays in addressing these qualities.
	Constructive alignment	
Enabling SBME Enthusiast	Identify and recruit SBME enthusiasts	This theme concerns promoting SBME value and leadership models including steering mechanism.
	Value system (Innovation Cycle)	
Local Medical Practice Connection	Developing collaborative convenor (Distributed leadership)	This theme reflects tutors' increased awareness of the importance of clinical practice collaboration.
	Medical school and NHS collaboration (de-departmentalisation and champion of innovations)	

4.3.1.1 Emergence of (from) Healthcare Problems and Medical Education Changes

Criticism of factual overload and dehumanisation through the traditional curriculum were a causative factor for the more integrated curriculum that began to emerge as long ago as the late 1970s (Brosnan, 2011). This was accompanied by an increased interest in curriculum

planning of undergraduate medical programmes in the UK, more specifically responding to changing healthcare needs and the provision of care and the development of the six educational concepts including Student-centred, Problem-based, Integrated, Community-based, Elective and Systematic issues (SPICES) (Harden et al., 1984). Education strategies, the so called 'SPICES continuum', offered staff a better understanding of curricular strategies and enabled them to better communicate the conditions for enhanced learning throughout the institution (Harden, Sowden, & Dunn, 1984). When the Dundee programme was designed the goal was for students to be competent and reflective physicians and a systems-based approach was employed to provide the context for students to achieve the learning outcomes.

The Dundee approach is based on the philosophy that 'a curriculum should be viewed not simply as an aggregate of separate subjects but rather as a programme of study where the whole is greater than the sum of the parts' (Harden, Davis, & Crosby, 1997). This approach was later adopted and recommended as a spiral undergraduate curriculum which was seen as the first step in the continuum of medical education. In the spiral curriculum, an iterative process of learning needs to be combined with repeated practice to develop an individuals' skills and anticipates the range and complexity of skills learning increasing as learners move along the continuum of the medical education programme (Harden, 1999). Harden argued that for the students to achieve the outcomes or standard required they must be assessed at a level of competence develops from simple to more complex concepts and practices on the completion of each year (Harden, 1999).

The changes in the external environment and the healthcare landscape have played a critical role in medical practice and medical education practice (medical education assets) in supporting SBME. SBME should therefore be understood as the usable learning material or utility of the interconnections between the history, epistemology and local medical practices such as spiral curriculum embeddedness. These interconnections are arguably what create the linkages between learning outcome (Task), process (Person) and Centre (Context) (see figure 4.5) and are what have enabled the all-important process of quality session construction to take

place within Dundee SBME. The following excerpt demonstrates how the sessions are constructed to ensure learning can be taken place:

> *"Whereas in a simulation centre, you, you've really got to make sure that every single person has the opportunity to, to learn and practice and to use part task trainers or models as, as is appropriate and to give the students that have some feedback." (Int Ref Medicalschool1_4)*

In relating this back to the conceptual framework (Figure 4.6), medical practice as usable asset for SBME tutors is therefore dependent on the context of healthcare service and medical curriculum associated with medical education. These clinical practices are linked and inter-dependent and are connected through spiral curriculum embeddedness. The elite commented on how the components in Figure 4.6 links to the UoD SBME model delivered:

> *"So once they've done that and they've looked at that in terms of all different types of patients, we then looked at the context in which that care was delivered." (Int Ref UoD1_4)*

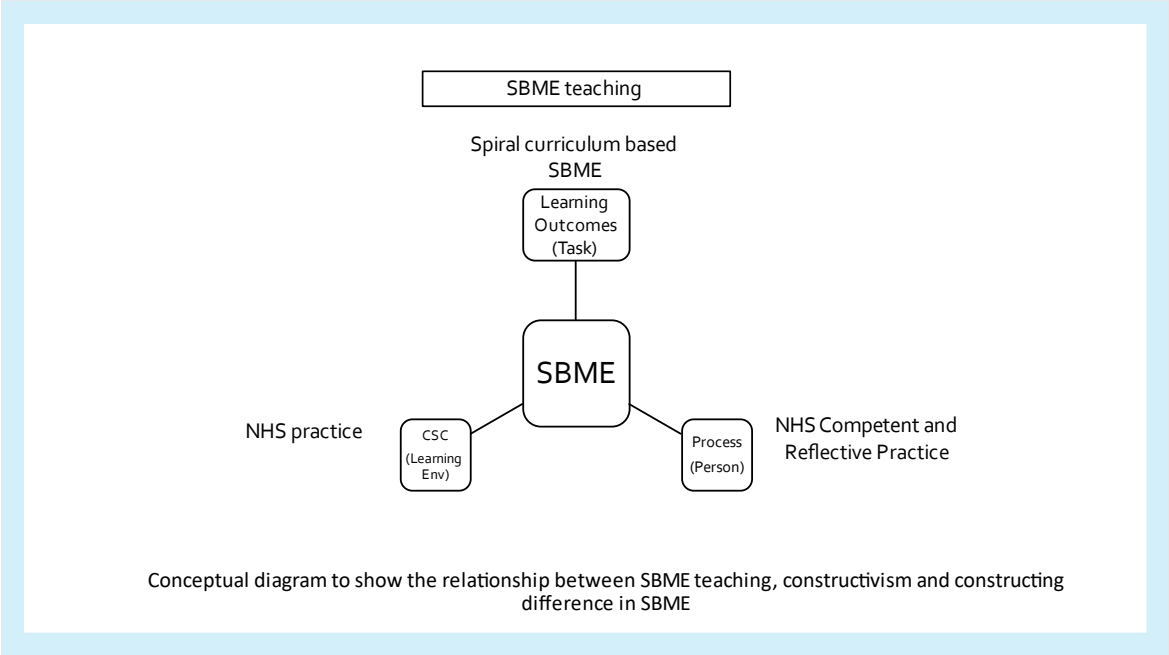


Figure 4.6: Conceptual Diagram Demonstrating the Relationship between SBME, Constructivism and Constructing Difference in SBME

Pre-COVID-19 medical practice ultimately allowed tutors to implement face-to-face UoD SBME for both for learning and for assessment purposes, allowing a degree of relinking with the medical practices that would otherwise take place in a different clinical setting is not accessible (Figure 4.6). This result adds another layer to the work of Harden proposing that changes in educational practice needed to respond to medical education landscape changes which in this case has emerged from the lack of a variety of patient exposures. The elite referred to how SBME is used in transition block to prepare students for seeing patient in various contexts.

> *"So the second transition block would be about looking at seeing patients in primary care, seeing patients in surgery, seeing patients and so that they would start to develop that, sort of prepare them for that contextual difference because you see somebody with abdominal pain and surgery is quite different from seeing somebody with abdominal pain in, in primary care." (Int Ref UoD1_4)*

Figure 4.6 offers a pedagogical representation of the implementation of SBME teaching, generated at the intersection of constructivism and the construction of learning which leads to UoD face-to-face SBME model. This is based on evidence from research situated in Scotland and can also be applied to the pre COVID SBME in Scottish context where face-to-face SBME teaching is well developed based on constructivism. In explaining the figure, areas of SBME have stronger linkages between healthcare service and UG medicine. During the pre-COVID-19 face-to-face and a strong linkage of SBME teaching, as seen in this Scottish medical school, tutors are informed by healthcare and medical practice needs because the medical education context enables them to commit to make a difference, establishing linkages between learning outcomes, teaching process and the Clinical Skills Centre (CSC). However, for face-to-face SBME, where there are intermediaries, the forms of capital are more important in terms of sustaining and differentiating SBME. Face-to-face SBME practice is now discussed to explain how they function differently.

From Figure 4.6, at UoD the constructivist approach is evident and being drawn upon as an asset by the elites and experts to differentiate their SBME. The healthcare service needs and medical education outcomes of UG medicine are used to create meaningful outcomes identified and their constructive alignments. For example, the end of year OSCE as outcomes identified enables the students to demonstrate evidence of competency as they collectedly experience in the early periods of outcomes construction. The area on the left appears that SBME designed are aligned with learning outcomes and are placed where there is a simulated medical education environment found associated with medical education practices. Moreover, as noted by some of elites and experts, these SBME activities are developed, communicated, and delivered to students, to reflect the challenging realities of the clinical workplace. The evidence can be seen in the excerpt below and the study guides used across the curriculum as shown on the right of the figure 4.7.

> *"We have OSCE at the end of the year. So there are degrees of simulation at the end of it in each year. Yes, absolutely. One of, one of the, I think this was unique things about the unique thing of the ward sim exercise is it is almost designed to be undoable and durable, yet you can't do everything that's expected of you in the time available. Um, because reflecting that simulates real life. So, you know, there's an element of, of prioritization having to leave some things to hand some things on." (Int Ref UoD1_5)*

Figure 4.7 the UoD spiral curriculum influences a sense of systematic needs and shapes an overall SBME implementation, particularly the way SBME is used to construct medical knowledge and skills towards the outcomes identified. Implementation is operationalised mainly by clinical skills centre tutors collaborating with NHS tutors rather than through adherence to an individual department. A shared understanding and value of SBME are communicated through organizational documents and activities associated with centralisation and systematic SBME embeddedness.

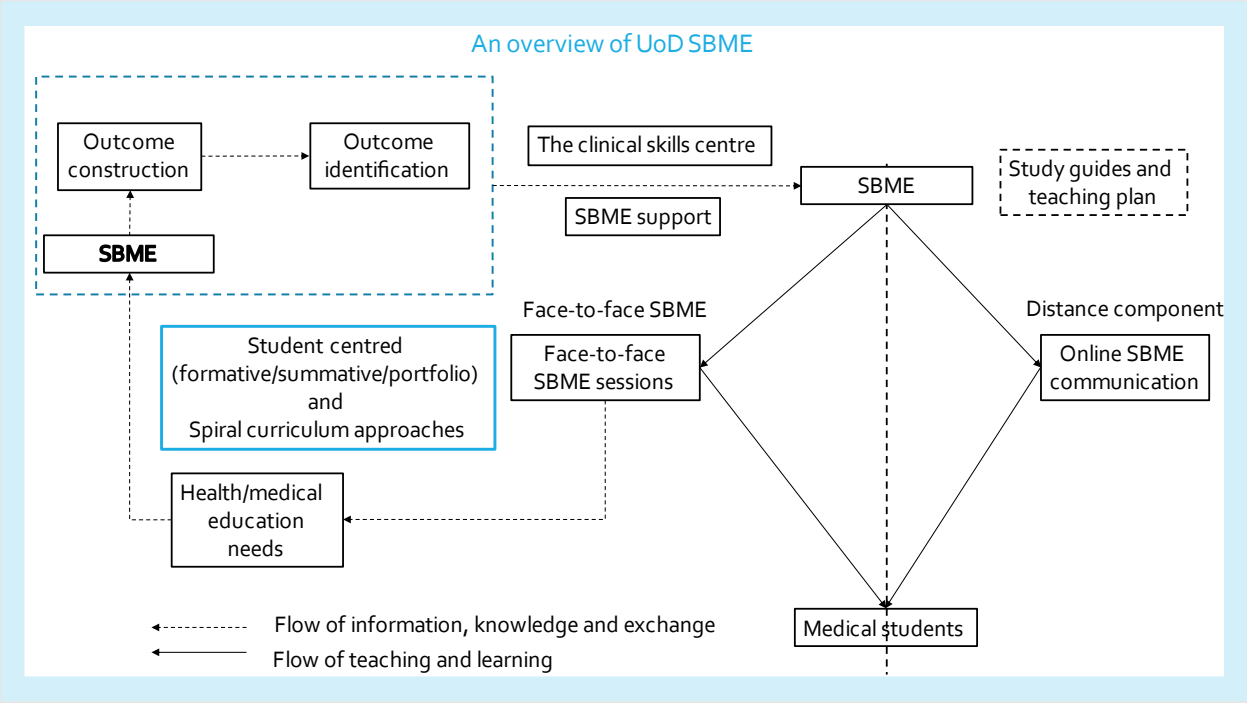


Figure 4.7: An Overview of UoD SBME

Given the extent of transformative activity around UG medicine and the medical school, tutors located there are at an advantage as the spiral curriculum strategies are in place. This advantage relates to constructive educational strategy and drawing upon exit outcome measures. The key point here is that when learning outcomes draw upon a practical nature of SBME, clinician tutors utilize particular contextual attributes enabling them to develop a progressive learning strategy that makes use of strong linkages between learning outcomes, teaching process and the simulated environment, the use of the clinical skills centre. When clinicians and non-clinicians are included in the utilisation of SBME, later, both groups have seen what SBME can deliver and, reciprocally, recognized it as an important form of medical education promoting normalization of this SBME which was new to UoD before the COVID-19 pandemic occurred.

Sevdalis (2013) states both technical and non-technical skills can become tangible and exist in objectified forms as outcomes of medicine. This is significant in terms of medicine because, as with other non-technical skills such as communication, medical practice is an important

tangible product that can be experienced as a representation of a particular behaviour, place or identity, even If the student has no direct affiliation with such people and place. SBME consequently presents an opportunity for individual students to embody culture (medical practice) and place (healthcare service), if only through acts of practicing in a simulated facility, reflecting, and receiving feedback. SBME has a unique role in communicating particular learning processes associated with a particular community of practice. Crucially, SBME tutors who are able to communicate these notions of constructivism embed SBME with value laden information are therefore making use of medical practice that supports spiral curriculum strategies through consciously integrating reflective practice,

> *"… and put reflective practice into the reflective practices was always part of, , that, that, that sort of, it, it is, I suppose it was always part of that approach is because, because you need to, in order for them to take learning from the student centre and then put it into practice in, requires reflective, um, uh, a reflective approach." (Int Ref UoD1_4)*

This is an important point, aspects of learning outcomes are influenced by linking the social and cultural context of healthcare and medical education. For example, the NHS National Early Warning Score (NEWS), which is the unique scoring system used to detect and response to clinical deterioration processes, is used to attach as part of UoD SBME. As such, NEWS used in SBME is an example that highlights how UoD values SBME by combining learning outcomes with culturally and contextually specific knowledge and skills involved. It is therefore important to consider how stakeholders interpret 'learning outcomes' and 'value-laden skills' within the curriculum that refer to notions of context and the process of healthcare service, and how this helps to foster stronger relationship of outcomes throughout UG medicine curriculum. The context of innovative SBME and the evidence base of SBME in some areas of wider medical education are now discussed to substantiate this point.

Knowledge and skills are therefore highly dependent on local medical education needs, learning outcomes and medical education assets that tutors engaged in SBME may be able to capitalize

on. Medical practice may not be easily utilized or communicated where there is less concern and association between contextual factors. Such linkages are needed for concepts such constructivism and outcome-based education to be constructed as a means of differentiation from other SBME models. This accounts for face-to-face SBME and SBME tutors from this Scottish medical school where linkages between learning outcomes, teaching process, and the simulated learning environment are clearer or systematically established.

4.3.1.2 Medical Education Needs: Learning Outcomes Identification and Construction

In this case study, the initiation of spiral curriculum and SBME implementation break down previous undergraduate medicine patterns of teaching and develop new ways of delivering medical education. The sessions are designed in a systematic way, where each session builds on what has gone before. Each session provides relevant information for the following session or system to be executed, this includes formative and summative assessments. This is because the models which were deployed, within the spiral curriculum involved a system coordinator and an identified team of tutors for each session. Pre-COVID-19 SBME also allowed the use of outcome-based education as a way to identify each stage outcomes to be met. This enabled the student to navigate to the exit learning outcomes and perform the practice integration activity. Overall, the SBME data collection for this case study indicated that SBME offered a valuable vehicle for supporting a spiral curriculum and outcome-based medical education.

> *"… what I mean is that, that the, the sort of continuum of learning whereby, um, we want to make sure that students are getting the opportunity to practice and role play situations before they're trying to do it in real life. So building up a kind of graduated experience with as same as I mentioned, really in the assessment side of things. So we can be sure that we've controlled as many of the parameters as possible in a simulated environment before real life the students to move on to that, into the complexity of the real life environment." (Int Ref UoD_1)*

The data also supported the assertion that there are two broad 'types' of SBME pedagogies which are used this Scottish medical school. These can be best understood using the terminology of 'outcome identification and 'outcome construction' (Figure 4.7). Figure 4.7 explains how SBME is structured and roles of SBME used across the curriculum. To some degree, all SBME sessions which are delivered as teaching tools are used for 'outcome construction', as they seek to offer experiences contributing towards annual exit outcomes identified and their progression through the medical education sessions, whereas the OSCEs used identify the outcomes to be assessed at the end of the year.

This is most relevant to medical schools which may have grown their students' capacity to practice and do not rely solely on SBME. For face-to-face SBME sessions, all are driven by the logic of spiral curriculum. The reasons for this are captured by one elite interviewee:

> *"So, what simulation can allow you to do is just chunk things down into small, really learnable outcomes, you know, components. And I think the tutors like that as well as the students because they suddenly thought what they were responsible for. It wasn't such a thing, you know, that they had to teach them the whole of the respiratory system in one afternoon. They just had to do this very small bit and they were making a contribution and, and that, that was acknowledged and the students enjoyed it."* *(Int Ref UoD1_4)*

Some of the elite interviewees clearly have considerations beyond outcome construction (formative assessment) and are engaged in a variety of SBME formats. This offers an indication that although they have 'outcome identification' (summative assessment) in terms of how and what outcomes to be measured, they are also active in participating in reviewing new teaching and assessment activities to generate and increase collective actions across the curriculum. Sessions are regarded as 'outcome construction' and 'outcome identification', because 'sufficiency' rather than progress aligns with the spiral curriculum. The current curriculum strategies are much more about keeping SBME and exit outcomes linked across the curriculum and more focused rather than participating in wider curricular activities that require

investments to expand resources and distribution capabilities. Moreover, choosing to remain in relatively small (chunks) sessions affords a greater degree of control over the outcome measures and teaching process. The elite reflected:

> *"So we'll review the curriculum in terms of what's been taught and make sure" that the stations and also the questions and the online exam, we're only testing things that have been taught. We also have built in case we missed something, we have a process where students can feed back to say we haven't taught them. And then we would then pick that up and review it…" (Int Ref UoD1_3)*

In this sense, a small chunk and focused SBME serves as a practice choice where students can develop their skills in a manageable way. Their exit outcome identification and outcome construction reflect what Harden (1999) describes as design action, making learning meaningful rather than just making learning. The elite interviewees also comment on the importance of creating increasing complexity of SBME across five years as it supports a spiral curriculum that goes beyond the logic associated with 'outcome construction'. They regard their spiral curriculum strategies as core to providing learning that has been valued since changing from a traditional curriculum in the 1990s. One interviewee commented:

> *"...there's a very clear progression in terms of, of complexity and also probably degree of simulation as well. And that at first, second year just here's a simulated patient who will give a history or allow themselves to be examined. Similarly in the fifth year OSCE, they will be uh, you know, usually an acute care station." (Int Ref UoD1_5)*

This situation whereby small chunk face-to-face tutors involved in SBME are driven by the spiral curriculum and medical education needs including healthcare, and medical practice occurs because the tutors can be from a range of backgrounds and disciplines. As they may be enthusiasts of established disciplines or individuals with limited knowledge of SBME or running the course, the flexibility in combining teaching methods has an effect on the types of SBME

and tutors' engagement and also determines the continuity in spiral curriculum strategies they pursue. This interviewee reflected on the structure and flexibility thus:

> *"they could take, they could take in Ninewells has demonstration rooms at the end of each ward. So I would say to the, there would be very clear instructions as to what was to happen in the two-hour clinical skills session, but how they practice. So it might be about this, about examination of the chest. So I had some teachers who would come along and they'd use our simulated patient for an hour and then they would take the students away to the ward for an hour to examine chest…and I would allow that because I thought it was a good way of engaging them and they, they had, they had to ask patients to see them. So we were, we did allow them flexibility as long as that they* met *the objectives of the session." (Int Ref UoD1_4)*

4.3.1.3 Emergence of SBME Structures and Clinical Skill Centre (CSC)

SBME and simulated practices have occurred as a response to the shortfalls of exposure to real clinical presentations in routine practice as such sessions have been engineered to create gradually higher fidelity representations of the clinical environment. SBME sessions then extend throughout the curriculum. The pattern and concentration of these sessions reflect the spiral curricular design through Systems in Practice (SiP) and Preparation in Practice (PiP) focused on preparation of the future medical workforce. The structures and instructions in study guides used enables students to understand how 'outcomes' are identified and constructed to help them progress to exit learning outcomes. The comment made by one the elite demonstrates how the students picked up messages communicated as they progressed through the lessons:

> *"I think using, you know, and then that's why we have used them early in the course so much because you know, they do now help set that relationship and start the process because obviously, you know, until the students I've been here for a while, their clinical skills are not, um, are not great, but you know, they can be, the communication skills are something that they can be picked*

up on really quickly and set the standard and introduce in clinical skills, you know, part of the simulation of the environment." (Int Ref UoD1_3)

Setting the exit and the stepping stone learning outcome is useful to understand how the SBME is structured and helps construct the competent and reflective practitioner. Shumway & Harden (2003) used the Objective Structured Clinical Examination (OSCE) to determine the extent of a clinical outcome achievement and measure clinical competence, with Year 1-3 being 'system' oriented and Year 4-5 focusing a 'preparation for practice'. According to the outcomes, the medical school displays the strong characteristics associated with learning progressive outcomes. Of the five years, Year 4 and 5 display a more developed and complex 'outcome based' SBME in comparison to much of Year 1 to Year 3. Furthermore, Year 3 and Year 2 SBME have a less complexity of outcome measured with Year 1 being the least complex SBME. This suggests that there is more complexity in the higher years of UG medicine as described by the interviewee:

"...there's a very clear progression in terms of, of complexity and also probably degree of simulation as well. And that at first, second year just here's a simulated patient who will give a history or allow themselves to be examined. Similarly in the fifth year OSCE, they will be uh, you know, usually an acute care station." (Int Ref UoD1_5)

Outcome-based medical education in Dundee is reflected through the milestones of student development revealed by this research, but neither fully explains why these trends exist. Shumway & Harden (2003) suggest that simulations have been used extensively to assess competence in medical education as they are approximations of reality and attempt to simulate a near real clinical scenario. Primary qualitative data from this study also supports these conclusions, as when asked about the reasons for using SBME, the elite interviewees suggest that it is not by a deliberate education strategy by UG curriculum, but rather through the quality assurance profile of a medical education, and due in part to the Tomorrow's Doctor and the Scottish doctor identity:

"And that's the kind of thing would come up in the quality assurance, you know, the GMC would say, how do you standardize, how do you ensure that people are being examined to the same standard. And a lot of that is around the approach that we have to our OSCE and the clinical skills and clinical skills staff development there from their training." (Int Ref UoD1_3)

The SBME being more accessible in the Scottish medical school arguably accounts for the utilization of SBME in the UG curriculum, as the terminology used by the medical school (clinical skills centre), aligns more with the place identity of training clinical skills in the medical schools. In addition to place identity, another important factor for the utilization of SBME in this medical school is physically localisation of the clinical skills centre in the teaching hospital. Indeed, one of the elite interviewees referred to this by citing the bespoke simulation centre as a reason for the strong relationship between medical school and NHS clinical staff in the area. This reinforces the idea that the Centre is a contributor to stronger relationships across staff in these areas:

"So we've got buy in that they'd get time off to come back to the centre. We're very lucky because the centre is within the hospital so they can do a ward round on a ward, come and do their Sim and back to the ward. You know, it's, it's really easy…" (Int Ref UoD1_2)

This interviewee's comment about having "the Clinical Skills Centre" in place is supported by the findings of Shumway & Harden (2003). However, these comments also indicate that there is also a relationship between enthusiastic networks and the opportunity for collaborative and innovative teaching. This shifts ideas about the reasons why some disciplines display a greater degree of SBME, as it is not just the resources and diverse discipline base that is a determinant for more SBME, it is accessing these resources and being connected to other disciplines that is a key contributory feature. As such, at the micro-level and with reference to normalisation process theory, sense making and cognitive participation play an important role in the development and implementation of SBME as will be argued in Section 4.4. This suggests that

being immersed and connected within SBME networks is an important pre-requisite of an early stage SBME implementation.

Figure 4.8 demonstrates that the existing UoD SBME is managed and run by the Clinical Skills Centre under the spiral curriculum strategies. With the collaboration of medical school and NHS tutors, sessions ranging from simple procedural SBME demonstration to the ward simulation can be delivered (column 2). The SBME implemented demonstrates the continuity of SBME learning across the curriculum. Figure 4.8 begins with providing an overview of the SBME upon which the simulation centre was available. The student development (i.e., SIP and PIP) is then used to explain the systematisation of the SBME used. The learning outcomes are identified and reflected teaching and assessment SBME needs. The complete SBME incorporated reflection and feedback indicated that the SBME is used as seeking value for student development.

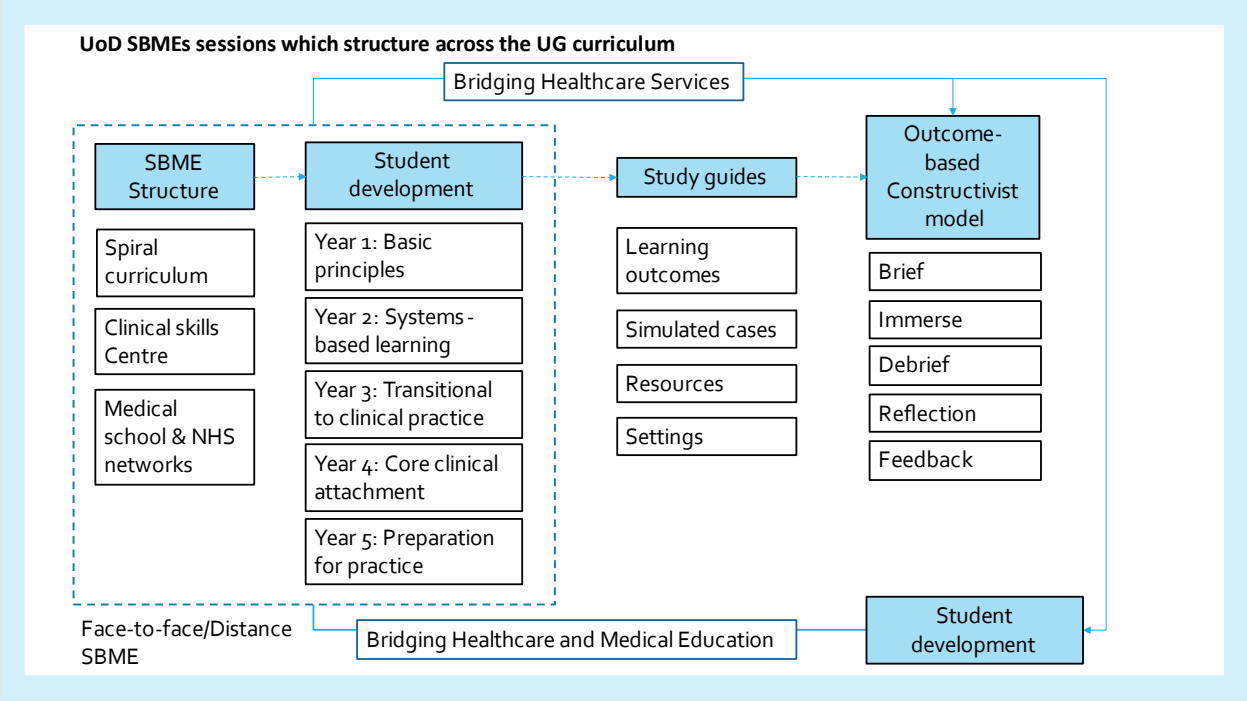


Figure 4.8: SBME Sessions Structured across the UoD UG Curriculum

In addition, the medical schools in this case study with more developed and normalised SBME activity, has developed a culture or practice of medical simulation where students and faculty value SBME and grow strong linkages to places and processes through SBME teaching; these

SBME pedagogical factors were discussed in Chapter 2. In this regard, notions of normalisation of SBME pedagogy and outcome-based approaches that are regularly used to define quality in medical education can be conceptualized as a form of new dominant system that the medical school draws upon to promote their teaching.

> *"So for the students, they loved simulation. Yeah. And so they were, they were in a way, almost the voice of, you know, we, we need more of this. So they were really advocates of this new approach. And that really sort of impacted on the clinicians who were, you know, suddenly realize that these students had, you know, all of them had the ability to examine a chest. All of them had the ability to try and take a history. So they started to engage more with when they see, when they see some students, when they see the feedback from students." (Int Ref UoD1_4)*

4.3.1.4 SBME (Face to face) as New Dominant Teaching Practice

Face-to-face SBME was the original focus of this research when it was introduced, there were only some medical school elites and some of the tutors work for NHS engaging in face-to-face SBME teaching. The tutors, at first, did not demonstrate an engagement in a SBME teaching as the face-to-face SBME introduced differs from a 'traditional' curriculum teaching, the way learning and feedback is given at the point of teaching. The elite interviewees later recognised the importance of embedding student's self-reflection and feedback attributes within the SBME. It is this strategy that enables SBME to occupy a learning space that can produce a higher premium over other teaching tools that perhaps do not effectively capitalize on concepts such as student-centredness and constructivism. This highlights the important of effective teaching focusing on learners in order to create reflective practice and sustain learning access, and as previously discussed with the elite interviewees, who engage in face-to-face SBME, positioning is an essential part of student-centred learning, identifying and constructing outcome quality and differentiating from other teaching tools. This awareness of the teaching and learning opportunity is encapsulated by the following statement:

"it takes time for people to engage and to see how helpful stimulation could be because here was a place where you could come and really focus on learners..., rather than having them on the ward and trying to teach them how to examine the chest on the ward and not being sure whether all 10 students learned the, the, the process. Whereas in a simulation centre, you, you've really got to make sure that every single person has the opportunity to, to learn and practice and to use part task trainers or models as, as is appropriate. And to give the students that have some feedback." (Int Ref UoD1_4)

These findings suggest that face-to-face SBME are viable types of SBME for medical education which deliver teaching that has learning and learning environment where there has been skills students can be possessed. The data indicates that fundamental to successful implementation of face-to-face SBME are in-house capabilities (physical space) and coordinated and incremental learning opportunities to maintain student's progression. However, unlike 'traditional' teaching methods, face-to-face SBME to support different spiral curriculum strategies enable tutors to retain a degree of control and to add value by embedding SBME with assessment cues around learning outcomes.

"We're very lucky because the centre is within the hospital so they can do a ward round on award, come and do their Sim and back to the ward. You know, it's, it's really easy…" (Int Ref UoD1_2)

There is a range of SBME located in the current Scottish spiral curriculum which involve different levels of outcome complexity. SBME tutors with a system responsibility are also engaged in direct or face-to-face SBME enabled by to the geographical proximity between SBME facilities, tutor and student. This is in comparison to some other institutes which have SBME facilities as an off-site hospital unit, but supply the SBME needs of the medical school, often using transportation between facilities. In these cases, extended clinical skills centre is used. An elite who had experienced the extended model commented:

"Um, there aren't many hospitals next to it. So for Kuwait a big city, obviously Kuwait a big city. So for somebody to arrange a session is just logistically very difficult." (Int Ref UoD1_2)

Different types of SBME identified in this case study are now discussed in more detail, beginning with the early years SBME. Primary data collection indicates that these early years of implementation formed the most common type of SBME that tutors use as an incremental or constructive (spiral) strategy. As noted previously, tutors typically draw on a combination of SBME, but separating each type of SBME in the following sections is necessary for the purpose of discussing and explaining the role in delivery of learning outcomes. The types of SBME that the medical school tutors use is typically 'face-to-face' SBME, whereby relationships with students occur through direct, in-person contact. There is also evidence of tutors engaging in more complex SBME such as those delivered within PiPs.

The information about how to categorise SBME was gathered through questions surrounding how SBME are delivered to students. The conceptualisations described by Shumway & Harden (2003) were used as a means to categorize learning outcomes. Here direct SBME involves a 'face to face' interaction and exchange between the tutors and students, the CSC involves teaching and preparation for it. Its role includes communicating the use of SBME and maintaining the quality of the SBME delivered. Table 4.3 provides a more detailed breakdown of different aspects of SBME at different stages and learning outcomes in the curriculum.

Table 4.3: UoD's SBME within the Spiral Curriculum

Year	Location	Type of training	Resources used to support SBME	Types of SBME
1	CSC	Procedural and consultation simulation	Simulators and SP	Face-to-face (individual and group)
2	CSC	Procedural and consultation simulation	Simulators and SP	Face-to-face (individual and group)
3	CSC	Procedural and consultation simulation	Simulators and SP	Face-to-face (individual and group)
3/4	CSC	Clinical management	Simulated ward and SPs	Face-to-face (group)
4	CSC	Acute clinical care management	Simulators (Simman 3G)	Face-to-face (individual and group)
5	CSC	Multiple case management	Simulated ward and SPs	Face-to-face (Individual)

Source: Documentary analysis (Study guides)

Simple, or single skill, face-to-face SBME are the most common form of SBME. SBME sessions range from simple procedural SBME to ward simulations, as is the case with Year 4 and Year 5, to students during SiP and PiP. Whereas the latter complex SBME was the case with Year 5 (a final year medical student) small sessions of the SBME in early years are designed and dedicated to a more complex medical scenario in later years as seen earlier in Table 4.1 which shows early year SBME are basic principles based on practical skills required to be used in clinical years, as well as the requirements that exists in the learning outcomes identified. SBME connects students with learning outcomes in the curriculum and medical practices required.

A determinant of the type of SBME that tutors adopt is influenced by the discipline or the organ system involved. For Year 1 SBME that require a basic degree of simple communication and clinical medicine skills, more links to the basic practice are necessary, and this can make SBME less complex than their later counterparts. This was evidenced in both interview and the study guide used to demonstrate how their SBME is organised. The approach adopted was outlined explicitly by one interviewee,

"So in the first year they're fairly simple and relatively short stations, take a history, do an examination, you know, very chunked stuff. Um, second and third year I think that a little bit longer. Um, but it's still very much really do, do one thing that need, maybe by fourth year the stations are a few minutes longer. Often there's more in terms of putting things together. So it might well be, take a history, do the relevant examination and look at results for, an individual simulated case rather than just do one bit…" *(Int Ref UoD1_5)*

SBME tutors provide SBME beyond the medical school and UG medicine (e.g, postgraduate trainees and pharmacists). The normalization and quality of the SBME is material because the SBME is eventually supplied across the curricular in Scottish medical education nationally and even internationally. This type of SBME could be classed as 'conventional' SBME because the SBME are treated as teaching tools, used to seek value for learning and assessment tools seeking value-for-learning; these depend on medical schools and course managers making educational decisions based around constructivism and a spiral curriculum strategy to support UG medicine. Face-to-face SBME value is founded upon and sustained not only the relationship of interaction, trust and respect between tutors and learners as reflection and feedback are central, but the value of the knowledge transferred and experience learned. This is also found in the change of an assessment process as referred to by the interviewee:

"…the change from your check listing based to domain base OSCE examination and put reflective practice into the reflective practices was always part of, um, that, that, that sort of, it, it is, I suppose it was always part of that approach is because, because you need to, in order for them to take learning from the student centre and then put it into practice in, requires reflective, um, uh, a reflective approach." (Int Ref UoD1_4)

Decisions on the organisation and delivery are not made based on educational considerations alone. As elite interviewees stated SBME is influenced by facility investment and financial

support from Additional Cost of Teaching (ACT[2]). Given that these spiral SBME are largely embedded and supported, it shapes tutors to determine their own structuring strategies and they are therefore able to differentiate their sessions by drawing on learning outcome, teaching process and learning space available.

UG medicine teaching and SBME has greater physical capital and financial capital than other courses, especially in terms of accessing financial support to instigate teaching from ACT funds. Scottish medical education can therefore create and sustain the SBME implementation and value added SBME such as the final year ward simulation because they have access to the key resources and assets needed and have the financial capital to be able to invest into the existing assets. This is captured in the following quotation from an elite interviewee:

> *"… there was an ACT committee, funding committee, that decides how it gets to wake it up and people within the medical school apply to get a little piece of that funding. So I guess over time the directors of the Sim Centre have said, I think the medical school could benefit from this. That's a play to act and seeing if we can get a little piece of that money to do that and that's how you get people employed. And then that's, so I guess I suspect" (Int Ref UoD1_2)*

SBME identified highlight how tutors utilized a combination of strategies to improve student's competency against learning outcomes. The SBME teaching took a face-to-face approach demanding an interaction between tutors and students. The following section explains how UoD recruit and motivate tutors to take part in this SBME teaching.

4.3.1.5 SBME Tutors (Champions) Recruitment, Engagement and Collective Action

In addition to high-quality learning interventions, an essential aspect for the implementation of effective SBME indicated in the data is strong leaderships and strong labelling about the necessary attributes of the teaching innovations. One of the elite interviewees acknowledge the

[2] Funding, called 'Additional Cost of Teaching (ACT)' is available to training providers who are facilitating university arranged Student Undergraduate Medicine's experiential learning as part of the undergraduate medicine curriculum throughout an academic year.

importance of sense-making process or making the purpose of SBME understandable and engaging through communicating this information to the SBME enthusiasts who may have potential to SBME tutors or become more strategically involved. One interviewee said:

> *"So there's key leadership roles. So we're trying to include them in the leader of, year one, the leader of year two, we'd have an assessment lead for year one and assessment lead for year two. We would, when, when I became clinical skills director, I would try and include clinicians to be the lead for the year one, lead for the year two program, lead for the year three, so that, you could get all these leaders together, every on a regular basis so that you could, really get them to have a cohesive approach where you had the intended learning outcomes, you had the curriculum program, and then you have the assessment." (Int Ref UoD1_4)*

The healthcare landscape change and the initiated spiral curriculum enable a traditional learning space to be occupied by SBME and to be valued based on constructivism such as attribution from tutors' and students' interactions. SBME can be differentiated from other traditional knowledge overload lecture-based pedagogies due to the opportunity for tutor interaction skills development (Harden et al., 1997). Furthermore, this type of SBME provides a viable spiral curriculum strategy not just for CSC tutors, but to other NHS staff, many previously UoD learners and, essentially who take part in delivering the integrated SBME to students. Indeed, the normalisation of an integrated approach is an important differentiating factor in replacing a prior dominant knowledge-based learning space. This is also captured by elite interviewees during the discussion about the types of 'practitioners' they want to have as their staff members:

> *"we don't do loads of faculty development here because they've had in their own training. But if you've got people who been clearly as a completely new idea, then they're, I think they are easier. I think they're easier to get satisfactory enthusiastic because they've no bad experiences and they just go,*

this is novel, this is new. And if you get them and train them in a way that really grabs their enthusiasm and imagination, then yeah, you're win these people." (Int Ref1_2)

In a similar fashion, elite interviewees emphasise the importance of locality and physical space, which inherently contributes to better involvement and engagement. Having local facilities is proved to be more effective than having remote facilities. This accessibility enables the participation and collective action of SBME tutors for the enhancement of student development (as noted by Int Ref UoD1_4) which are an important part of UoD medical knowledge construction and SBME differentiation. This person stated:

"it takes time for people to engage and to see how helpful stimulation could be because here was a place where you could come and really focus on learners. Um, rather than having them on the ward and trying to teach them how to examine the chest on the ward and not being sure whether all 10 students learned the, the, the process." (Int Ref UoD1_4)

Face-to-face SBME delivery is made possible through the collaborative relationship between the medical school and the hospital. The networks that exist amongst staff throughout the medical school and NHS is an important finding from this Scottish research. It not only highlights the dependence of medical education integrated teaching on collaboration between medical school and NHS staff, but also serves as a bridge between diverse disciplines and roles, including a greater diversity in professions. For SBME tutors, both medical school staff and NHS clinicians, are better encapsulated in the term 'active clinicians'. The elite stated:

"I think we wanted to have a, um, a mixture. So we tended to have, um, in, in the helping to, um, to run it. We had, um, yes, GPs, we had endocrinologists and we had accidents and emergency clinicians who have a broad view. I think that's quite useful. I wouldn't like to see, um, a skill centre just being run by GPs or primary care people. I think you do need, um, you know, hospital

clinicians and general surgeons were always, um, welcomed." (Int Ref UoD1_4)

The links that are often established at the medical school through the use of system convenors foster mutually beneficial relationships with student developmental milestones across five years. This enables them to oversee and integrate the systems in the curriculum by working collaboratively with a variety of tutors under a range of spiral curriculum strategies toward the exit outcomes. One of the interviewees reflected about the importance of having system coordinators:

"we internally have a lead for each system block, so there's tick cardiovascular for and work it through. As an example, um, so kind of ask is a year of one block a system block? We have, XXX is a tutor in the Sim Center and SSS as the overall lead for that system in the wider medical school curriculum. So XXX speaks to SSS and coordinates what can be delivered in the Sim Center within that individual book that then I guess feeds back into the clinical skills teaching group, which is trying to look at all five years. And so she will report back with clinic the cardiovascular bit of the curriculum…SSS's wanting us to do this straight, you know? Okay, fine. And I suppose the other link there is there's a year one lead and there's a year one to three lead who would be keeping an overall handle and all of the systems within their year." (Int Ref UoD1_2)

Moreover, tutors usually have an in-house session of teaching training, a range of SBME beyond the tutors' disciplines is needed (e.g., teaching and assessment). This is captured by elite interviewees, who also alludes to going 'beyond discipline' to source integration in order for their SBME to be sustainable. Similarly, an elite is often 'encouraged' to go beyond their discipline-based interests for the sake of a wide range of teaching. However, it is evident that supporting collective action is a priority in terms of integrating medical education for their SBME:

"But the other thing is that the general medical council who regulates our profession also in a, I sort of um, I sort of teaching component of our licensed to practice. So teaching and training is part of our requirements for our license to practice. And it might just be that you take them on a ward round, it might might be on the job teaching, but you have to provide evidence, now for revalidation that you are doing your teaching training." (Int Ref UoD1_4)

The reason elite interviewees support having a bespoke simulation centre cannot be solely attributed to financial or cost of teaching. Rather, it is because having a centre and a responsible person facilitates cognitive participation, ideology and epistemology, as well as, increase collective action among those in a similar position. The elites agreed that the funding used to create a network of enthusiast teaching leads also facilitated the leadership bridging the SBME and the envisioned SBME implementation:

"...as a result of that in Dundee, we actually got substantially more money over a period of four or five years. So this was new money. So what we were able to do was, um, it was sort of ring fence, that money, the money that was always there, who knows where it, if you can't, you can't get your hands on it. It's just used. So this was new money. So we now have a network of teaching leads who are often, you know, there maybe paid for two sessions a week, um, to coordinate teaching in that area. So there'll be a, you know, a surgical teaching lead, want to be an ENT teaching lead, uh, cardiovascular teaching lead. Now they're not doing all the teaching, but their role is, is to try and coordinate teaching." (Int Ref UoD1_5)

This supports the work of Issenberg et al.(2003) who argue that implementors engaged in SBME implementation often draw upon traditional curriculum networks when necessary (in times of high educational demand, for example). As such, it is unsurprising that there is a 'hybridity' of both traditional, integrated chains delivering alongside more traditional chains. However, there exists an underlying preference for the de-departmentalisation of the medical school.

"I think we wanted to have a, um, a mixture. So we tended to have, um, in, in the helping to, um, to run it. We had, um, yes, GPs, we had endocrinologists and we had accidents and emergency clinicians who have a broad view. I think that's quite useful. I wouldn't like to see, um, a skill centre just being run by GPs or primary care people. I think you do need, um, you know, hospital clinicians and general surgeons were always, um, welcomed." (Int Ref UoD_4)

While there is evidence of a strong preference to work and develop relationships at the micro level, the UoD SBME model goes beyond preference and relies on the integration of various disciplines. In this instance the ability to develop and sustain medical education collaborative relationships with other actors involved in SBME (such as CSC tutors, NHS staff) is essential to their integrated spiral curriculum strategy. The interviewee commented on how the collaboration was initiated by disempowering the department:

"And what we did was we centralised, um, that sort of process so that we had, uh, uh, uh, medical school office. And so we brought in all the administrations from all the sort of departmental areas and it held them centrally, and that really, um, disempowered the department." (Int Ref UoD1_4)

Evolving networks locally can also be based on pragmatism, rather than solely a 'regard' for other SBME tutors. The degree to which tutors collaborate and develop networks with others depends on their underlying motivations, medical educational goals and spiral curriculum expectations. This is now discussed, considering how tutors engaged in a range of SBME determine their spiral curriculum strategies and make use of the resources and networks available.

4.3.1.6 Pre-COVID-19 SBME and Local Medical Practices

The preceding discussion about medical practice was centred primarily on face-to-face SBME. For SBME, where interaction occurs on a 'face-to-face' basis between tutors and students, constructing quality around learning outcomes and, therefore, bonding relationships with clinicians/tutors and bridging between classroom and real medical practice are key features.

The social conditions (healthcare service and medical education needs) are the key asset while the structure and process facilitate effective SBME. This is because learning outcomes are more easily communicated through the educational relationships among curriculum, tutors and students, as opposed to relying solely on other outcomes cues either implicit or explicit in study guides and other materials. This is noticeable within study guides as they communicate direct from the medical school to either tutors or students.

> *"I think we'd, I think people like to know what they're responsible for. So, what simulation can allow you to do is just chunk things down into small, really learnable come, you know, components."* (Int Ref UoD1_4)

Here, the quality of the SBME requires the interaction that exists between tutors and students. SBME is significantly influenced by the type of interaction and relationship that exists between the tutors and students rather than any educational strategy based around SBME, processes and the CSC. As such, the SBME is facilitated by social conditions as well as medical practice. Here the interviewee describes their experience:

> *"Everybody had a clinical role as well as the, and it might just be one day a week, it might be two days a week, it might be three days a week. But you had to have some sort of link to link between the clinical cause. I would see, I would see students in my general practice who I was training. So one day I might be seeing them in the Sim Centre and I'm teaching them cardiovascular examination. The next day they may be seeing me in my practice where I'm delivering the, and I said I think that was, it was a good thing for credibility as well as for helping them transfer their learning." (Int Ref UoD_4)*

This indicates the importance of the practice role amongst tutors in assuring up-to-date experience and promoting networks and relationships through direct contact and interaction accompanied by deliberate teaching informed by learning outcomes. Notions of learning outcomes are implied and need to be explicitly seen in the study guides. Additionally, communication with the CSC, study guides and tutors fosters a greater sense of cognitive

participation and collective action with the outcomes assessed. This is captured by an elite interviewee, who cited the direct relationship between end outcomes and SBME designs:

> *"I suppose simulation starts at assessment and goes backwards into teaching, whereas I would say in good educational design, simulation starts, and teaching and it's included in assessment because it's more reproducible as assessment than trying to take students into a clinical environment. So there's a little bit of that kind of flipping of the paradigm if you like." (Int Ref UoD1_1)*

Face-to-face components are also more conducive to online SBME learning when certain types of SBME are involved. This is important to understand because online components have later become the primary communication and education focus of the curriculum during the COVID-19 pandemic, and so more detailed comparisons need to be explored. The nature of the online component can either present certain limitations regarding distancing or increase accessibility. This distancing property of the online component is a determinant of the type of blended SBME that can be used. Unlike face-to-face SBME, the online component has a far shorter 'interaction' and is more vulnerable to relationship, meaning that the more extended the distance learning component becomes, the smaller the window for face-to-face SBME and physical interaction there is. However, pre-COVID online SBME components existed and were used to increase accessibility to some of the materials, e.g., study guides used for SBME.

The ex-director was attempting to make an arrangement that would see their SBME distributed to the rest of the curriculum, creating face-to-face SBME via pre COVID-19 curriculum, which would serve as the intermediary between tutors and students. The reason for this 'working out' as the elite put it are captured in the comments made by a senior SBME member who is involved with managerial aspect of UG medicine. The senior member cited an existence of the CSC and the nature of SBME as enablers when dealing with teaching.

Face-to-face SBME is, therefore, arguably more suitable when integrated teaching is involved and where enthusiastic tutors have the capability and capacity to use it. This form can integrate the clinical teaching and the SBME arrives at the point of teaching more effectively and with

additional distribution. This is a reason why elites continue to operate successful SBME and OSCE in CSC where resources and supports are available. These forms of SBME enable face-to-face SBME tutors to retain control of teaching and assessment, but at the expense of distribution across the curriculum. This is clearly a trade-off that SBME tutors face when determining their spiral curriculum strategies.

4.3.2 H2: Disruptive Innovation over the Period of COVID-19 Pandemic

Pre-COVID-19 SBME with a stretched curriculum and expanded learning opportunities in medical education started to emerge prior to the pandemic (see Figure 4.3). In this study content in SBME, the pandemic has illustrated that distance education, online learning and other blended are fundamental to managing education, teaching, learning and assessment, across disciplines and learning continuum. To mitigate strained medical education resources, SBME experts experienced impacts of the pandemic and scopes of their practice were changed. The difference of pre- and during COVID-19 pandemic SBME are demonstrated in Table 4.4. Four over-arching themes were identified, along with definitions and sub-themes (see Table 4.5). They are expanded below, with selected quotes highlighting the content of each theme.

The disruptive changes created similar problems to clinical experiences and immensely unsatisfactory medical education, particularly in areas involving social interactions and clinical practice. Changes included contact time restrictions, shorter duration of training and staff shortages from social distancing preventive programmes (GMC, 2020). This once more resulted in the deficiencies in a range of skills in training as a result of changes in a disrupted healthcare service. The blended SBME learning and the exposure to clinical skills became commonly accepted as educational goals in response to the changes in medical education needs due to social distancing. In the UK, the recognition of the need for preparing competent tomorrow's doctors with appropriate skills and attitudes has remained the goals of GMC and MSC. During the pandemic, Dundee was among one of the medical schools incorporating blended learning in clinical skills units into its undergraduate programme.

"In order to ensure that medical students receive all the training that is needed to meet the General Medical Council's Outcomes for Graduates, before graduation medical students will need to be able to see and take part in the treatment of real patients under supervision. Whilst it is possible to support some learning online and through simulation, particularly in the early years of medical studies, clinical placements must be made available and maintained for students." (MSC, 2020)

Table 4.4: UoD Pre and Post COVID-19 SBME

Year	Location	Pre COVID-19		COVID	
		Resources used to support SBME	Types of SBME	Resources used to support SBME	Types of SBME
1	CSC	Simulators and SP	Face-to-face (individual and group)	Simulators/ online	Blended and prioritised face-to-face SBME
2	CSC	Simulators and SP	Face-to-face (individual and group)	Simulators/ online	Blended and prioritised face-to-face SBME
3	CSC	Simulators and SP	Face-to-face (individual and group)	Simulators/ online	Blended and prioritised face-to-face SBME
3/4 (Transition block)	CSC	Simulated ward and SPs	Face-to-face (group)	Simulators/ online	Blended and prioritised face-to-face SBME
4 (Acute care)	CSC	Simulators (Simman 3G)	Face-to-face (individual and group)	Simulators/ online	Blended and prioritised face-to-face SBME
5 (FYWSE)	CSC	Simulated ward and SPs	Face-to-face (Individual)	Simulated ward and Professional SPs/online	Blended and prioritised face-to-face SBME

Source: Document analysis (Study guides)

GMC recommendations target medical schools to introduce blended approached to educating medical students with SBME and offer support for learners and educators to use blended SBME. The concept of blended SBME began with 'UK government recommendations' commonly referred to as 'social distancing', it was generated through healthcare facilities, medical schools and an extensive public and professional bodies to ensure that the public is safe from the

pandemic. Like the UK Government, the Scottish Government focused much effort on defining and explaining 'social distancing' for undergraduate medicine which are used as foundation for pedagogical shift.

> *"Like the wider profession, as a medical student you must manage your own health. If you're unwell, you should not attend teaching sessions, placements or assessments, and you should self-isolate in line with national advice. This is particularly important in clinical settings, where patient safety should always be your priority. Medical schools and placement providers should make sure that you have the equipment and the information to work safely in clinical settings." (GMC, 2020)*

This pedagogical shift seems to later be the accelerator of the development of blended SBME that continues today in order to provide a more flexible learning environment for students to develop clinical skills from a distance. GMC (2020) argued that the prioritisation of appropriate clinical skills should form part of the curriculum to provide a safer environment for practicing and ensuring the practical knowledge can be taught during the pandemic. As attention is paid to the learning outcomes and individuals' health and safety, prioritised SBME exposures are believed to contribute to the exit outcomes.

> *"Learning opportunities from providing support to address the COVID-19 response are significant, but it is recognised that there could be an impact on anticipated learning and trainee progression given that trainees may fail to meet some of their curriculum requirements. However, the statutory education bodies together with the GMC and AoMRC (the Academy of Medical Royal Colleges) are determined to ensure the longer-term needs of doctors in training are not compromised." (GMC, 2020)*

The SBME is prioritized and used in combination to create an integrated clinical educational model that is appropriate to use across the entire 'social distancing' period. Reflections used in the SBME remain central to the foundation for life-long learning and continuing professional

development. This could be achieved by strengthening the role of SBME to create a distance teaching.

While the focus of this research phase was on the conventional face-to-face SBME, there is also evidence of a more blended SBME during the COVID-19 pandemic (see Table 4.5).

Table 4.5: Themes and Sub-themes Identified for COVID-19 SBME and Broad Definitions

Theme	Sub-theme	Explanations
The re-emergence (recognition) of disruptive healthcare and medical education problems	Re-acknowledging the problem and the importance of social interactions	This theme highlights tutors' awareness of the importance of social interaction for their own SBME teaching and students' learning
	Re-acknowledging importance of SBME	
Impact on SBME	Prioritising face-to-face SBME	This theme highlights the extent to which tutors have begun to prioritise blended SBME, or have a plan to do so due to the pandemic
	Prioritising online SBME	
Impact on quality and the wider medical school determinants	Re-acknowledging importance of blended learning	This theme centres around the idea that COVID social distancing has influenced quality of blended learning and the roles that tutors plays in addressing these qualities.
	Changing roles of pre-session components in facilitating sessions	
Impact on learning environment	Physical Distancing	This theme reflects tutors' increase awareness of the importance of health and safety issues. This theme relates to tutor-learner-patient health and well-being.
	Socially distancing	

4.3.2.1 Re-acknowledging the Emergence (recognition) of Disruptive Healthcare and Medical Education Problems

In acknowledging these issues in relation to changes due to healthcare and medical education disruptions, this theme is broken down into two subthemes: re-recognition of the importance

of social interactions and the importance of SBME aspects of clinical teaching. The value of face-to-face teaching appears to be re-acknowledged as mentioned by the participant:

> *"Think it's an evolving situation, I think things are changing weeks and month to month, that in terms of any sort of anything that will be lasting, any long-term change... I don't know, I think it's making educators think about the value of... I think more carefully about the value of face-to-face teaching, I think it's making educators think were carefully about the necessity of face-to-face teaching, and I think it is prompting new ideas to be tried out and put into practice to a bit like the example of the session I just described before..." (Int Ref UoD2_2)*

The statements suggest that tutors recognise the problems and the contextual value of the spiral curriculum SBME relates such understanding to the value of pre-COVID-19 SBME as well as those of others in their wider medical education communities. SBME and blended SBME were introduced to offer SBME 'business as usual' for clinical teaching while there were reduced social interactions. SBME has, therefore, been prioritised to be taught in a face-to-face mode:

> *"We're still doing it, we've been getting permission to do this to-face teaching, so COVID had a massive impact on us when it comes to the group size and PPE and what we can teach and what we can't, but at least we can still do face to face teaching ... most department can't do face to face teaching at all, and therefore maybe it had a more profound effect on other departments rather than us as we remain a degree of face to face teaching whereas the other departments cannot do at all." (Int Ref UoD2_4)*

The interviews captured the sense that SBME tutors described becoming more aware of the emergence of the COVID-19 pandemic and the re-emergence of healthcare and medical education problems conceptually but may not have made changes or plans to change the entire

curriculum strategies. One of the participants described how the curriculum strategies (principles) were unaffected.

> *"I don't think the principles have changed. The simulation is always about doing something that's authentic and help students to learn in a safe environment where you can progressively... When you can make something progressively more challenging once they start to build up confidence, and I think we're still using those principles... Absolutely." (Int Ref UoD2_1)*

4.3.2.2 Impact on SBME

The pandemic occurred has rather withdrawn the existing teaching processes. It has facilitated the tutors to reflect on their strong commitment on the spiral curriculum:

> *"So in terms of the curriculum as a whole is still, to my understanding, very much a spiral curriculum, and I don't believe there's any plan to change that." (Int Ref UoD2_2)*

As SBME was prioritised, the tutors have begun to adapt their teaching sessions and a system-wide concrete plan to change because of the social distancing. It reflects changes in SBME pedagogy that align with the innovative SBME these champions had better delivered.

> *"I think our team has, after considering lots of different possible ways of doing things as... I would be lucky to find yourself in a situation where we currently are allowed to bring students in for face-to-face and simulation, and my hope is that we endorse in a physician going forward where we can continue to bring students in for face-to-face teaching and I think the reason for that is the actually simulation-based teaching and the way we have been delivering it for years works, and therefore I think it's... I'm very relieved at the moment, we are still able to continue delivering it in that way." (Int Ref UoD2_2)*

Most tutors reported blended SBME activities as the prioritised medical education teaching. The specific SBME sessions were prioritized over the others and selected for teaching in a face-to-face format, while OSCEs as the learning outcome assessment were most keen to maintain or innovate. The tutors stated:

> *"It's more, what do we need to do face to face and what maybe doesn't need to be done face-to-face, and as a result, your six sessions become three that have to be face-to-face and three that can maybe be delivered in another way, and your three face to face ones you've been got. That's all make sense." (Int Ref UoD2_4)*

4.3.2.3 Quality of SBME and Wider Medical Education Teaching

This is a broader theme and touches on the management and supports in medical education. It relates to tutors teaching and assessing the quality of medical education delivered.

Underpinning this is a shift of relationship between learning outcome (Task), teaching process (Person) and Learning environment (Context). The three components were prioritised and selected to appropriately deliver in the time of pandemic. The quality of issues around SBME was raised included the dynamic of this TPC relationships as this participant reported the selection of communication skills and other subjects to be taught online:

> *"all their communication skill sessions are online because they don't need to... it doesn't depend on doing things physically with equipment, and all of their basic science learning is online as well, and how that works is we try to use a flipped classroom approach, which means that students are given reading materials or recorded lectures in advanced, and then we'll have a question and answer sessions afterwards, so that they can raise any issues that they haven't understood or ask any questions, so that's the way we were managing the online aspects" (Int Ref UoD2_1)*

Some interviewees suggested an increase in prioritising and combining components with risk - assessment towards these sessions, which, outside the pandemic, are seen as the new requirement for wider UG medicine.

> *"So it changes a little bit in that regard, but because of the nature of the simulation and the types of intended learning outcomes you're trying to achieve, there's actually very limited amount can be taken away from face-to-face and present it online, ahead of a face-to-face event. So I think if your, of course is designed well and aligned well with the teaching…then actually is. In Sim, it probably isn't that much they can go online, so then about to deliver it safely… That's about, I guess, risk assessment, and that needs to take into consideration, obviously, national, local guidance as well as institutional guidance to allow you to risk assess activities and design it accordingly." (Int Ref UoD2_5)*

There is also an expression of increased understanding of the changes of roles of pre-session components in blended SBME that play in pandemic SBME. The online components became a preference for the new blended SBME implemented as can be noticed from the following excerpt:

> *"it was all in an online classroom environment, the session involved pre-recorded videos, which were shown to the students and involved online consulting with a simulated patient in a virtual formats, so the students were all at home in an online classroom, they consulted with a patient with an acute problem and the patient required to keep medical admission. The next part of the session involved seeing ward hand over that was pre-recorded, and they watched that patient that they had decided to needed to admission. They watched patient being discussed in a ward hand over, and then they also watched a ward round that had been pre-recorded with a patient that they had referred into hospital was being seen, umm seen and assessed, and the*

main learning objectives for that session relate to students learning about for the learning opportunities that exists and a ward handover and a ward round setting, and those with the main objectives both in the session being done face-to-face and the session when it was being done online, that it was done in a very different formats." (Int Ref UoD2_2)

4.3.2.4 Risk Assessment and Encouraging Safety SBME

This highlights that learning through the pandemic has made tutors reformulate the SBME in relation to health risk assessment and safety. This involves the issue around how to conduct OSCE appropriately in the time of pandemic:

"The... I 'can't really comment specifically, but we're talking about the same things and they need to be led to their inline simulation instead of real clinical experience maybe needing to be increased, and of course, the simulation and the assessment... And there's a lot of discussion at the moment about how best to manage OSCE which are essentially simulations across across the country. So there's a lot that's very active topic at the moment..." (Int Ref UoD2_1)

Within this theme, responses highlight the recognition that certain mitigation strategies for COVID-19 transmission are modifiable: bringing forward the preventive measures. Collectively, these responses suggest a shift in the thought on tutor-student roles and the teaching contract, whereby the importance of SBME benefits the student in their day-to-day learning but continue to offer life-long learning benefits for medical education and practice. This shift from student-tutor-patient to student-tutor-patient-simulated patient is central to the delivery of blended SBME.

There was, thus, evidence of adaptation in the range of resources and an orientation of the resources which did not mark a major shift towards SBME in the UG medicine context during the pandemic. The following example demonstrates the shift of face-to-face to blended SBME in one of the blocks:

"The com(communication) course is entirely online and remote, so they're doing via blackboard collaborate ultra and they're not bringing any of the students, tutors or SPS in. They're doing it all virtually, and you could say.. That's a material change, but actually in reality, it seems that it runs not that dissimilar to normal com sense, to be honest." (Int Ref UoD2_5)

4.3.3 H3: Transformative View of SBME

The TI can also draw attention towards systemic patterns. These patterns represent a number of central practices created by those who are maintaining them at present. This third horizon or H3 is the voice of the visionary and can also be seen through these horizons. Without prompting the conversation, a pattern of activities with more 'open and positive' perspectives are reported during the interviews as follows:

4.3.3.1 There is a Potential for Future Blended SBME (H1 view of H3)

Small scale blended SBME have been distributed throughout the existing SBME prior to the pandemic. Rather than being a disruptor, the pandemic was witnessed as an accelerator for the innovation. These initiatives were seen as future of the current UG medicine.

"we do worry about capacity and how we give adequate experience and teaching to all of our students. So we were starting to think about using online sessions and recorded sessions and more the flipped classroom approach and doing perhaps more in simulation in anyway, but there was understandably some resistance to change and some concern about change, but now covid came along and we have to do those things, the people who have realised that they are possible and has adapted to them, so it's helped us in that way, and we have staff and students" (Int Ref UoD2_1)

The interviewees in UoD seem to look for 'sustaining innovation' - to improve the existing constructive SBME, making it more prioritised and safer when delivered from a distance. Problems were identified and used to build the knowledge of the blended learning and explore

the possible routes for finding solutions and teaching tools to deliver the blended SBME. The tutor mentioned:

> *"Now, that's what this is all about, and now I've seen it work. I know that it's nothing to be as good as nothing to be scared off. So I think if that is taking away that the uncertainty of something that you don't know, and a lot of people have come up with the idea themselves because it seems like the obvious way of doing it, and I didn't realise that that's what we were talking about, when we talk about flipped classroom." (Int Ref UoD2_1)*

4.3.3.2 Sense of Direction towards Technology Enhanced SBME (H2 View of H3)

There were creative processes of developing new teaching approaches that challenge the existing face-to-face SBME practices. The interviewees brought in blended SBME as an inspirational 'disruptive innovation' supporting sense for future direction. Diverse creative approaches were found as alternative methods and strategies for undergraduate medicine teaching:

> *"learning the learning skills and virtual consulting is valuable because it is directly transferable to real life, actually, I think that's a skill which is going to be required …going forward into the future, it will be more of a to consulting as a result of... COVID, yeah. Firstly, in relation to that first consulting, those are valuable skills that will be required, I think in clinical practice, anyway, I'm just thinking about other aspects of your question, the students are learning in clinical skills when they come in, about the PPE and the measures that are required to protect themselves and others, and that is also obviously very directly transferable to a clinical staff, they're learning those skills and having to put them in place, we can... They're in at the moment. And so that is a training for a clinical environment." (Int Ref UoD2_2)*

SBME leadership required could be seen from the SBME team who understand the problems and opportunities. The changing role in seeking directions and leading change to shift the system by releasing existing (H1) resources to operate in an innovative way was reported:

> *"No others in medical schools do sim, but we are the only parts in the medical school that doing sim, so there wasn't really the opportunity for different areas of medical school to give us ideas because we're the only people doing Sim, which we just have lots and lots of departmental discussions and ever since lockdown happened. We've been having weekly meetings online with everyone in the department and just sharing news, coming up with ideas, trying to prioritise things, bouncing things off from one another, and I wouldn't say that we've got ideas about... from elsewhere in the medical school." (Int Ref UoD2_4)*

4.3.3.3 Deeper Issues of SBME Value (H3 view of H3)

The H3 visionary is looking for 'transformative innovation' – seeking to shift face-to-face constructive SBME value into the direction of blended learning aspirations. The pandemic led to both a rise of re-evaluation of the existing teaching approaches and also an increase of new models disseminating shared essential face-to-face SBME components and the use of online tools to support this.

> *"It made us reevaluate what we teach and how long we spent teaching it, because clearly there's a sort of taught that from the university though, was that program should review all the teaching activities to ensure that.. it was essential, and it was essential at that point in time, and couldn't be delayed to a different point, of course, they also wanted it to... Once you establish the essential… then is the essential deliver face to face or is it possible to deliver online. And so anything that could be delivered online should be..." (Int Ref UoD2_5)*

The pandemic has proved that it is possible to embody a new blended SBME in the present where the resources can assemble, growing over time a blended SBME for the wider undergraduate medicine curriculum as a whole. The existing distributed leadership model demonstrated the perspectives and capacities of the UoD SBME tutors to act and lead the success of transformative innovation. From this, the essential face-to-face SBME and the supporting online component changed fundamentally. SBME successfully and systematically mobilised tutors, time, available space and resource to support changes. As a result, medical school leaders demonstrated their understanding of the value of SBME in the time of pandemic. The elite reflected on SBME in the time of pandemic:

> *"we're talking about the same things and they need to be led to their inline simulation instead of real clinical experience maybe needing to be increased, and of course, the simulation and the assessment... And there's a lot of discussion at the moment about how best to manage OSCE which are essentially simulations across the country. So there's a lot that's very active topic at the moment..." (Int Ref UoD2_1)*

The findings now focus on the relationship that exist amongst SBME NPT related factors throughout the implementation, as the collaborations and networks SBME tutors form with one another has emerged.

4.4 NPT Implication in SBME Implementation

This section investigates the implementation of SBME and SBME practices and has provided insights on how UoD overcomes barriers and theoretical approaches to translate SBME into practice. NPT has been applied to explain how SBME is understood, used and embedded in UoD practice. The explanation provides a social process through which SBME is operationalised in this UoD setting.

My findings describe data from interviews and documents used in the implementation. They demonstrate that interviewees regarded the processes as to how they collectively understood

SBME (coherence), how they agreed to engage with SBME (cognitive participation), what resources they need to have in order to work (collective action) and what they need that reinforces the implementation (reflexive monitoring). Therefore, they did not only enact these SBME. In addition, they constructed a set of meanings for their SBME implementation which is significance as a teaching practice.

The results of analysis revealed interconnected themes in relation to the SBME implementation which resonated with the constructs of NPT (see Figure 4.9):

Coherence: Unity between SBME curriculum and practical reality

Cognitive participation: Challenges and enablers to legitimise the SBME in practice

Collective action: Spiral UG implementation of SBME

Reflexive monitoring: Shared tutors' reflection on SBME practices.

Two themes were identified that described the determinants for actual implementation of SBME:

Workforce collaboration: Curriculum pressure and prioritisation of SBME in medical education (Agreed on student centred and outcome-based education)

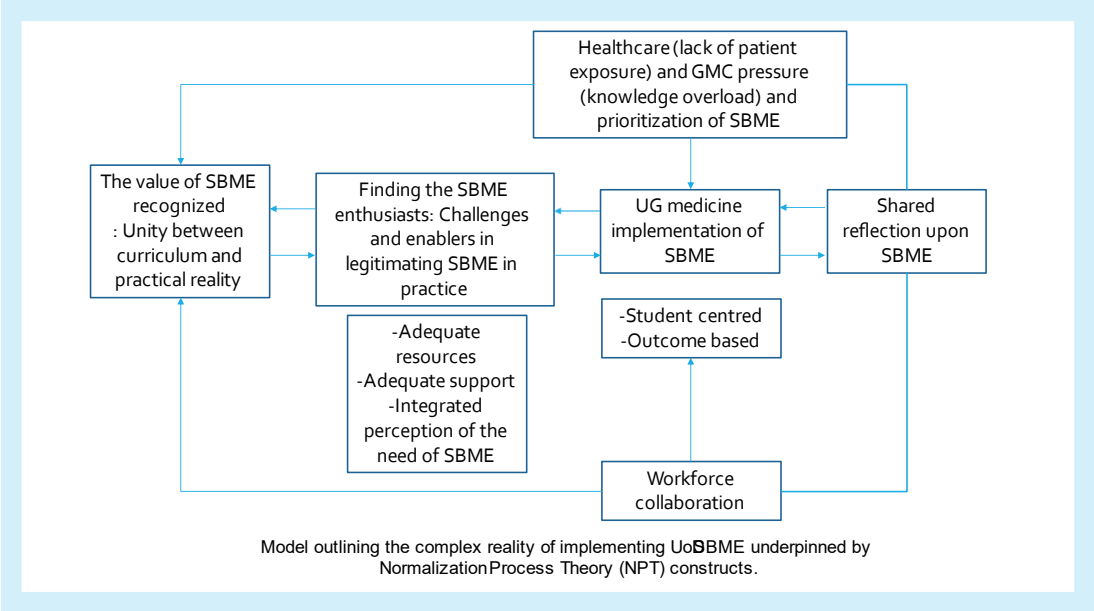


Figure 4.9: Model Outlining the Complex Reality of Implementing SBME Underpinned by NPT

The relationship between themes is depicted in figure 4.9 above. This illustrates how NPT constructs underpin the analysis for UoD logic model. Similar to the four NPT constructs, the themes interact dynamically and non-linearly to provide an explanation of SBME implementation.

The following sections examine the understanding of SBME implementation in each stage of NPT in details (Section 2.7 in Chapter 2). The aims are to identify the micro and macro environment affecting implementation and provide an understanding of NPT constructs over the period of pre- and during the COVID-19 pandemic. Therefore, it is important to investigate whether the influence of micro and macro environments resources and functions which subsequently enable the execution of the disrupted SBME implementation process.

Overall, coherence and cognitive participation influenced (and were influenced by) collective action in shaping of tutors teaching practices towards implementation or enabling SBME teaching. This results in a sense of unity of SBME curriculum and teaching practice alongside challenges and enablers of legitimate in practice. Implementation was often operationalised by adherence to spiral curriculum constructs rather than through reproducing SBME formats. Shared reflection on SBME practice, workforce collaboration and healthcare service and medical education pressure further triggered and drove the actual implementation of the SBME. Essential aspects that could be argued to promote actual implementation included facilitating roles such as interventions to promote alignment of the curriculum with outcomes and local practice, SBME training and regular procedures to monitor teaching practice.

The following section will discuss the revealed interconnected themes in relation to the implementation of SBME which echoed with NPT constructs.

4.4.1 Coherence: Unity of SBME Curriculum and UG Medicine Teaching Practice

The study objectives are used as a basis to explore issues emerging from the data that illustrate the constructs of NPT (O'Donnell et al., 2017). The objectives are: 1) to explore SBME practices, 2) to examine the relationships of different micro and macro contexts, and 3) to determine the

role of context and how innovative SBME contribute to the UG curriculum. The following explains the flexible construct on sense-making process of UoD.

The "exploratory of SBME practices" aims to provide a basis to understand the importance of SBME. It recommends three main activities for tutors to follow including *considering key medical education need(s) and problem(s), identifying alternate solution(s),* and *identifying medical education enthusiast(s).* In this case, the latter activity was very much required because SBME has already provided an alternative solution for integrated clinical teaching and assessment by UoD. The other two activities have been identified in the interviews and organisation documents. The first activity requires tutors to consider key medical education problem(s). These derive from healthcare system problems affecting medical education as an external entity. This is because the SBME proposition is not entirely related to a previous traditional UG medicine curriculum implementation process. The second activity recommends a set of possible solutions that can assist tutors to investigate their perception on SBME. In this case, the process used two key questions: "What do you think about the SBME implemented? and "How are the SBME designed used?". These solutions derived from Table 3.6 and are selected because the study proposition falls into the "integrated learning" and "learning outcomes" categories. The outcome of this stage was the prioritised list of importance of aspects of SBME.

The processes through which participants share and create an understanding of SBME conformed across interviewees. Overall, participants described the unity between SBME and the practical realities to achieve targeted learning outcomes in medical education. Within our data, participants working on UG medicine and SBME expressed their opinion and experience that the SBME provide a safer learning environment and SBME implementation could not be overlooked in this UoD undergraduate setting:

> *"we want to make sure that students are getting the opportunity to practice and role play situations before they're trying to do it in real life. So building up a kind of graduated experience with as same as I mentioned, really in the assessment side of things." (Int Ref UoD1_1)*

In the clinical skills centre settings, SBME in the spiral curriculum were perceived to be fit for purpose and were linked to the conceptual foundations of the spiral curriculum i.e., as a continuum of learning, whose complexity increases step by step, therefore needing sensitive designs focused on learning outcome measures. During the data collection, compliance with SBME' and spiral design was evident:

> *"So from years one to three, it was very much you came to the simulation centre and it was part of the integrated program and we prepared, you had a regular weekly session as a student and then when it got to years, four and five, when you're out in your clinical attachments, we developed sort of specific training when you're on those attachments." (Int Ref UoD1_4)*

> *"I think our OSCE reflects increasing complexity. So in the first year they're fairly simple and relatively short stations, take a history, do an examination, you know, very chunked stuff. Um, second and third year I think that a little bit longer. Um, but it's still very much really do, do one thing that need, maybe by fourth year the stations are a few minutes longer. Often there's more in terms of putting things together. So it might well be, take a history, do the relevant examination and look at results for, for, for an individual simulated case rather than just do one bit, you know, take a history in the station, doing an examination and that station of somebody else. It's putting it all together." (Int Ref UoD1_5)*

Some elite interviewees regarded the SBME as teaching tools that can be used to bridge medical knowledge on emergent practices in which would also motivate and promote sense-making among tutors:

> *"That's a challenge to consider it because another key thing as well as all your internal staff being active clinically, I think you need quite a high throughput of people who are mainly clinical. But, uh, from the surrounding hospitals, I think that's a really healthy thing. They make sure everything you're doing is*

up to date. They make sure everything's still relevant. They make sure that the centre is very credible. Does that make sense? Within the local medical community? And I think that that's really important. That's really, really important. And then people buy in because if they, if they see someone that they respect and the clinical world delivering some sessions, it must be worthwhile, I'll than do some of that too. That's one of the strategies. Um, yeah, you need to create a critical mass there. I'd say that's a, so say faculty, Faculty are key for your centre. They really are key good faculty, good centre." (Int Ref UoD1_2)

In this medical school when tutors were engaged, they well-positioned to prioritise student-centred approach as well as supporting learning relevant to clinical needs, stating that:

"it takes time for people to engage and to see how helpful simulation could be because here was a place where you could come and really focus on learners. Um, rather than having them on the ward and trying to teach them how to examine the chest on the ward and not being sure whether all 10 students learned the, the, the process." (Int Ref UoD1_4)

Tutors agreed that SBME fit for purpose because they continued to keep spiral curriculum strategies used and identified learning outcomes throughout the pandemic. This strong relationship also influenced the innovative blended SBME implemented after the social distancing package was launched. When asked about the changes during the pandemic, an elite replied:

"So it changes a little bit in that regard, but because of the nature of the simulation and the types of intended learning outcomes you're trying to achieve, there's actually very limited amount can be taken away from face-to-face and present it online, ahead of a face-to-face event." (Int Ref UoD2_5)

The implementation requires the participant's value and motivation in trying to incorporate the intervention. The following construct explain how the tutors believe and how well the intervention fits in with existing undergraduate medicine approaches.

4.4.2 Cognitive Participation: Challenges and Enablers in Legitimatising SBME in Teaching Practice

The "examination of understanding of SBME in UG medicine" indicated four key activities relevant to those implementing SBME under NPT framework (O'Donnell et al., 2017): 1) relation workability selection, 2) enrolling enthusiasts, 3) legitimating or defining possible contribution, and 4) defining actions and procedures needed.

The relation workability selection requires UoD SBME implementors to undertake a number of activities: 1) setting up SBME, 2) setting structures, and 3) engaging with SBME enthusiasts. The set up activity aims to select appropriate attributes to use for the SBME structuring stage. As recommended by the NPT framework stage, the selection process was based on the initiation stage, Objective Structured Clinical Examination (OSCE) was used to ensure structural integrity and relevance towards exit learning outcomes construction. The setting (new) structure activity then was not necessary at this stage as all the structure needed for analysis is available. The engagement with SBME enthusiasts was used as the steering media and mechanism. It is important to mention that this activity was identified from conducting the case study as useful for performing analysis between the interviews and the enacted attributes of the medical school documents. One of the interviewees commented on the existing SBME and the development of SBME use in teaching and learning:

> *"what I mean is that, that the, the sort of continuum of learning whereby, um, we want to make sure that students are getting the opportunity to practice and role play situations before they're trying to do it in real life. So building up a kind of graduated experience with as same as I mentioned, really in the assessment side of things. So we can be sure that we've controlled as many of the parameters as possible in a simulated environment before real life the*

students to move on to that, into the complexity of the real life environment." (Int Ref UoD1_1)

In addition, the investigation of the workability selection involved two more activities, namely '*enthusiast identification'* and *'enthusiast recruitment'*. These activities identified from the interviewees are part of the implementation support functions. As cognitive participation requires motivated participants and their engagement in implementing the intervention into the existing environments, SBME is evidently valued in the data and therefore legitimatised in the context of UoD faculty. The findings from this study revealed that participants face less challenges in legitimating SBME in practice due to: (1) full support from the management, (2) adequate resources and (3) collaborative perception of fit-for-purpose for medical education issues (a solution for knowledge overload and reduced patient exposure). These factors influence the progress towards learning outcomes measured and the decision-making that promotes activation of SBME teaching, in turn driving the collective efforts by which SBME is implemented.

"I think that leadership is hugely important. So if you're trying to introduce something as radical as simulation in a new environment, then you're going to need people…So you need people with energy, with enthusiasm, with a good understanding of what it is that they are both trying to do on a day to day level. So they understand the operational side, but also they understand what's going to change as a consequence…. So both outcomes in terms of individual students, but also what …. how will the system benefit from this?" (Int Ref UoD1_1)

Participants repeatedly referred to their responsibility to implement SBME, citing awareness of integrated and spiral clinical teaching and assessment as their main motivation to continue implementing SBME (in interviews). However, implementation seemed to be undermined by a feeling of insufficient support from NHS management and leaders. This occurred in the medical school:

"we have a wonderful, um, set up of OSCE, but progress through the years and getting more complex and better simulation. That doesn't work. If you don't have a whole lot of NHS people saying, yeah, I'll volunteer for the, for the session because OSCE takes an awful lot of people. Yeah. So that's been a chronic difficulty is getting people to result the OSCE, to make it run." (Int Ref UoD1_5)

In this UoD site, resource issues have been reported to be adequate to support activity (during the field visits) including support from the clinical skills centre (e.g., enough simulated ward equipment), technical staff and additional payment for the teaching budget. Within the elite interview, they revealed how their attitude of 'buying in' to implementation of SBME was significantly framed by financial context. The following offers an indication of the importance of investment from elite interviewees working within the clinical skills centre:

"…simulation is really important and you know, this, I've got such a future as the costs around it, it tends to be very expensive from, and I think that Dow simulation suite is about 12 million pounds worth, if you actually cost it everything that was there. So it's very expensive, but it's worth it." (Int Ref UoD1_3)

"I think again, it's something that has grown. I think it wasn't there at the start. It's something that I suspect that has grown. Um, in that obviously act, which is the thing that fund. The big pots of money that funds the medical school is divided up to deliver the curriculum." (Int Ref UoD1_2)

Resource availability was motivational and increased compliance by tutors was then considered more possible. Compliance with existing SBME structures was considered feasible in UG medicine settings, as mentioned by the interviewees on the accessibility of simulators and simulated resources within in the hospital facility. The following are issues reported in relation to the accessibility of clinical skills centre:

"So 200 people come through the door each day on average or something like that. Or have, we have over 800 people that week. Eight to 900 people come through the door." (Int Ref UoD1_2)

Another challenge SBME tutors encountered with legitimating SBME was how to enable the implementation with SBME understanding. The recruitment and training provided to SBME enthusiasts' created an opportunity to build a critical mass of shared understanding and promote engagement in SBME practice, which was obviously seen through the UoD context. This depended on a range of factors highlighted in this interview:

"So, I think having, the new simulation centre actually was, a very open and transparent example of how we were investing in medical education. Um, and I think what some of the clinicians saw was they saw that it could be actually quite useful for their own clinical development. So they would start to come and use some of the models and the training opportunities." (Int Ref UoD1_4)

Documents, study guides, identified that SBME structures relating to the set learning outcomes were visible throughout all study materials. Clarity of learning outcomes and availability of spiral structures were highlighted by interviewees. Elite interviewees found learning outcomes identification and construction not difficult to understand, and communicate with tutors or course designers as this quote from elites on how the weekly outcome is identified and sessions are weekly constructed:

"you know, once we decide on the patient of the week, then that actually started to dictate what would be your content. And you would know that between Monday and Thursday you had so much time and you would be, you knew that you every week you would have, so you couldn't, you could alter the sort of course of the week a bit, but you couldn't alter it that much." (Int Ref UoD1_4)

The constructive alignment has also been implied at meso- and macro levels of implementation:

So there's a very clear progression in terms of, of complexity and also probably degree of simulation as well. And that at first, second year just here's a simulated patient who will give a history or allow themselves to be examined. Similarly in the fifth year OSCE, they will be uh, you know, usually an acute care station. (Int Ref UoD1_5)

When UG medicine or SBME tutors focused on their students' exposure to designed clinical teaching, they tended to endorse actual and collective implementation of SBME instead of contributing to symbolic implementation. An enthusiastic perspective on exposure to clinical teaching might encourage compliance to SBME and lead to more engagement. One elite interviewee illustrated this idea by reporting his reaction to an episode of compliance. The elite interviewee observed tutors moving from clinician tutors to SBME tutors with role changing. When asked about his perception, the elite interviewee stated:

"... Ninewells has demonstration rooms at the end of each ward. So I would say to the, there would be very clear instructions as to what was to happen in the two-hour clinical skills session, but how they practice. So it might be about this, about examination of the chest. So I had some teachers who would come along and they'd use our simulated patient for an hour. And then they would take the students away to the ward for an hour to examine chest. And I would allow that because I thought it was a good way of engaging them and they, they had, they had to ask patients to see them. So we were, we did allow them flexibility as long as that they met the objectives of the session." (Int Ref UoD_4)

These value-laden SBME issues were modified to ensure that they could support the transformative innovation of UG medicine and maintain learning outcome construction over the pandemic as described by one of the participants:

"all their communication skill sessions are online because they don't need to... it doesn't depend on doing things physically with equipment, and all of their

basic science learning is online as well, and how that works is we try to use a flipped classroom approach, which means that students are given reading materials or recorded lectures in advanced, and then we'll have a question and answer sessions afterwards, so that they can raise any issues that they haven't understood or ask any questions, so that's the way we were managing the online aspects." (Int Ref UoD2_1)

The enablers tutors received with legitimising SBME was full of support. Communication and training was described as a potential opportunity to create shared understanding of SBME value. When the tutors focus on students' learning opportunity, they tended to agree on systematic implementation of SBME instead of contributing to assessment.

4.4.3 Collective Action: Spiral Implementation of SBME

Actual implementation of UoD SBME is the systematic SBME that tutors perform teaching based on spiral SBME practices. The data (from documents) revealed that these enacted UoD undergraduate curriculum of SBME can be resources or procedures for individual organ system teaching. The analysed study guides demonstrate the way tutors and students interact with enacted SBME and indicate how SBME are delivered in practice. When implementation is systematic, individuals tend to be focused on the learning objectives set as well as how to ensure that SBME is used to build student's capacity to practice. One example of this is illustrated in the following interview excerpt:

"…then fifth year, the OSCE you there with 14 minutes long station is known as a long station. Again, what we're testing is can, can you do the role of an FY doctor? Um, and so that are quite complex tasks within the 14-minute OSCE. Um, so, um, there's one, we've got several actually in different scenarios that would involve managing a blood transfusion. Um, so it might well be speaking to the patient or simulated patient to begin with. Could involve taking blood, give filling out the form, send him a blood off for cross matching with, you know, phoning the porters to say it's urgent. Um, and then receiving the

blood, having to set up, yeah, have the IV, prescribing it, kind of do the whole thing within 14 minutes." (Int Ref UoD_5)

During data collection, elite interviewees often indicated that tutors see the sessions adhering to the learning outcomes and local medical practices as an indication of when learning should be mapped and aligned in the process of identification and construction of learning outcomes. What was written in the study guides was used by tutors and students who approached and engaged in the sessions, demonstrating to stakeholders that they were following the study guides and achieving the session's learning outcome(s) set. Similarly, when clinical skills centre, staff and simulated medical resources were being used, only scenarios related to real local practices were incorporated. In addition, resources are systematically utilised, and access to SBME is made available for learners at all levels.

Workforce Collaboration, Curriculum Pressure and Prioritisation of SBME

Tutors' issues affecting SBME workforce capacity included changes to SBME tutor role, leading to feeling of certainty about 'what to teach'. Changes of tutor roles were described in interviews as enabling and boosting the morale of tutors, as it meant that resources and support also adapted based on their requests. Tutors did develop responsibility and maintain confidence in delivering complex SBME which was influenced by learners' outcomes:

"I mean, well, and what they're learning. If, if what we were doing in clinical skills wasn't considered to be of value, then they wouldn't do it. But every time they're in there, they are immediately seeing the relevance of what they do to their clinical careers." (Int Ref UoD1_1)

Overall, I found that all settings curriculum pressure (the outcome to be met) leads to systematic rather than symbolic implementation of SBME. The need to implement was found to lead tutors to reproducing or simulating the sessions and reflecting on the exit learning outcome in which fit for their future practice. The interviewees commented SBME value upon the curriculum:

"We can see the value of it. Yeah, absolutely. Yeah. Yeah. Um, and we didn't use to have a fifth year OSCE, but we were keen to have required to do by the, by the GMC." (Int Ref UoD1_5)

"... we will be constantly questioned by the GMC and I hope it will be insured in the people that we are saying are fit to proceed or fit to graduate." (Int Ref UoD1_3)

Although the consistent standards or structures of SBME are considered to promote good practice and continuity across academic years, difference in learning outcomes means that SBME practices were selected and prioritised as confirmed by the time of the pandemic. More collective efforts towards compliance were observed in study guides distributed during the disruption (e.g., setting the simulated scenarios as mentioned in the study guide).

Tutors reported being involved in various tasks that they repeatedly selected and prioritised what to deliver in the face-to-face format and performed standard procedures and structures: brief, emerging, reflection and debriefing, as demonstrating in the following excerpt from the interviewee:

"I think we reached the conclusion that you could only take certain practical skill acquisition to a certain level before you need to have the students there in with you to give them that direct feedback and supervision, there was a lot of consideration given to whether we could achieve some of those aspects in an online format, so for instance, having students log in to an online classroom and perhaps be working with their flat mates and have a tutor observing what they're doing and giving them feedback." (Int Ref UoD2_2)

In a decision-making process, elite interviewees collectively prioritised producing and reproducing the current implementation of SBME or adaption to suit learners' needs. Some face-to-face SBME were acknowledged as being specific to the willingness of the engineered learning environment, something that 'everybody has to experience; hence normalising can be seen from these SBME practices:

"the principles were that we needed to deliver the practical clinical teaching for all five years, and we needed to make sure that that was safe, and we also need to consider the fact that we might have to do more simulation-based training than usual because the students won't have any opportunities for working with real patients at the same time." (Int Ref UoD2_1)

It is important to note that prioritisation of SBME actions was observed through every year that students progressed and across all settings. In the time of COVID-19 pandemic, while some of SBME sessions and their components were prioritised and contextualised to be delivered face-to-face, some were conducted virtually:

"…we were trying to move all teaching into virtual teaching, so that the students had ongoing learning, but obviously not in a clinical environment. So the over the summer, we spent a lot of time trying to work out how we could then both catch up clinical placements for the fourth years as they moved into fifth year and deliver the 5th year placement and continue to move everything into a blended learning format, so there's been a huge amount to do. And there still is quite a lot, so we had to think about different ways of doing our assessments, so moving away from an OSCE to something Virtual in this Academic year, but now what we're spending time thinking about is how to make the assessment covid proof for the new academic year." (Int Ref UoD2_1)

The existing appraisal processes led to the modification and reconstruction of the SBME practice to enable the implementation. The following section explains how and when reflexive monitoring occurred and affected the implementation.

4.4.4 Reflexive Monitoring: Shared Reflections on SBME

The "reflexive monitoring" stage recommended by the NPT made clear that tutors should: 1) seek to determine how effective and useful the practice is, 2) evaluate the worth of a set of

practices, 3) appraise the worth of the program, and 4) attempt to redefine procedures or modify practices.

In this case study, the evaluation of the worth of SBME was performed and a series of appraisals were provided for further continuous improvements. Elite and expert reported in interviews that appraisal of SBME implementation was a common practice and was formalised at individual and collective levels. Individually, SBME implementation was appraised in many ways through occurrence of improvements such as faculty development:

> *"I think having more in house for faculty and generating a system where you bring people in, uh, would be the way around that. The other thing is to have an inhouse faculty of experts that do faculty development and quite a big believer in this and then send faculty out into the clinical workplaces to do some in-situ sim. Um, so you have like a centre of excellence and you bring in four or five clinicians, workout what session is. if they need some help, develop it, help them design it, uh, train them on how to deliver it and send them out and to in-situ sim, you send random the tutorial room in the hospital. Uh, I think that's, that's really good. Good way of doing it. And then they might come back and do some stuff with you." (Int Ref UoD1_2)*

Communal appraisal leads to attempts to modify or reconstruct SBME practice to enable normalisation. When reflexive monitoring was attempted at collective level, attempts at reconfiguration of the practice can occur. An elite interviewee reports indicated that collective appraisal of implementation of SBME was a common practice and was formalised. Collectively, SBME implementation was appraised through feedback given from the stakeholders:

> *"So for the students, they loved simulation. Yeah. And so they were, they were in a way, almost the voice of, you know, we, we need more of this. So they were really are advocates of this new approach. And that really sort of impacted on the clinicians who were, you know, suddenly realize that these students had, you know, all of them had the ability to examine a chest. All of*

them had the ability to try and take a history. So they started to engage more with when they see, when they see some students, when they see the feedback from students." (Int Ref UoD1_4)

It was also identified that quality assurance, potential opportunities for monitoring SBME practice were always used for educational purposes. Interviewees noted that practice was not changed during the audits, but changed when it needed to be improved, for example, the communication skills delivered in the time of the pandemic:

"The communication course is entirely online and remote, so they're doing via blackboard collaborate and they're not bringing any of the students, tutors or SPs in. They're doing it all virtually, and you could say That's a material change, but actually in reality, it seems that it runs not that dissimilar to normal communication sense, to be honest." (Int Ref UoD2_5)

In the time of COVID-19, Tutors, individually and collectively, appraised the face-to-face SBME as worthwhile for using in blended teaching sessions. Although the accuracy of some virtual components compared to previous face-to-face teaching was questioned, the recognition of unchanged learning outcomes led to the blended SBME being appraised as valuable:

"Think it's an evolving situation, I think things are changing weeks and month to month, that in terms of any sort of anything that will be lasting, any long-term change... I don't know, I think it's making educators think about the value of... I think more carefully about the value of face-to-face teaching, I think it's making educators think more carefully about the necessity of face-to-face teaching, and I think it is prompting new ideas to be tried out and put into practice to a bit like the example of the session I just described before..." (Int Ref UoD2_2)

The facts that tutors received (positive or negative) feedback on SBME delivery might enable the reconfiguration of practice towards better delivery in a particular context. Regular procedures for monitoring implementation played an important role in feeding back into the

purpose and improvement of SBME thereby reinforcing the alignment of evidence with learning outcomes. This can be found when the tutors adapted pre-COVID SBME and performed blended SBME with the collective prioritisation of face-to-face component, hence normalising and learning from SBME principle.

4.5 Summary

This chapter has focused primarily on the findings that have emerged from the Scottish-based research. This chapter has outlined the structure of the Scottish medical school, and how the profile of SBME within the organization supported the SBME implementation. Pre-COVID-19 SBME involved more 'face-to-face' SBME in comparison to the COVID-19 SBME. As such, SBME tutors, using more 'face-to-face' areas, were able to draw upon the spiral curriculum to differentiate their SBME delivered through face-to-face SBME. Spiral SBME curriculum refers to constructing different strategies through the levels and complexities of identified learning outcomes, notions of health services and generalist practices. This is identified to be more effective where the linkages between learning outcomes, SBME process and engineered learning environment are stronger and more established.

For face-to-face SBME, drawing on the spiral curriculum and practical reality (medical practice) attribute is also important. These types of SBME are facilitated by relationships built on interaction and trust between tutors and students. Moreover, the same notions of interactions often underpin face-to-face relationships that exist from small-chunk simple SBME to a more complex SBME used in the Scottish medical school. This research supports the existing typologies of 'outcome identification' and 'outcome construction'. These labels reflect how SBME are driven by a range of outcomes that cannot be reduced to traditional curriculum taught alone. Rather there is evidence that tutors seek spiral curriculum strategies and outcomes that constructively align with broader values and practice choices. As such, there is evidence that spiral curriculum strategies are characterised by more constructivist, meaningful outcomes in tandem with SBME based assessment, further reinforcing the argument that construction and identification are not a dualism but rather a continuum.

These findings suggest that SBME elite and experts experience of the COVID-19 SBME facilitated reflection of the impact of the pandemic on their teaching, their innovative SBME, and their awareness of teaching and learning quality. Analysis of Vallée et al. (2020) identified that blended SBME learning might be a more valuable approach that provides better effects on outcomes when compared to traditional learning in health education. This can offer a double dividend since blended learning is also acceptable to the students. Current disruption in medical curricula accelerates abundant opportunity to include blended elements, and the findings indicate that this should be further explored for specific design variants of a blended learning model. For example, SBME has been used to teach communication strategies for virtual rounds during the pandemics, resulting in positive feedback (Sukumar et al., 2021). Medical electives are another valuable opportunity for blended learning, with evidence that they contribute to provide educational experience and garner interest in the field (Steehler et al., 2021). While the pandemic has been a limitation for many, it highlights the usefulness of blended SBME in teaching clinical medicine the concepts they had not previously hold in high regard, particularly during the non-COVID-19 teaching.

In this section, I presented themes that provide an understanding of elements needed for systematic implementation of SBME and innovative SBME. My findings suggest that implementation of SBME and the innovative SBME has been operationalised through the re-translation of SBME, rather than through adherence to performance of the pre-COVID SBME model. Our findings also provide insights into transformative innovation to make SBME align with disruption. At a practical level, this disruptive innovation is supported by the medical education strategies used at UoD, stakeholder engagement and distance learning technologies, while taking Scottish healthcare and medical education context into account.

Chapter 5: Understanding Transformative Innovation of PCM Simulation-Based Medical Education

5.1 Introduction

This chapter presents Phramongkutklao College of Medicine (PCM) SBME as the second case study using the lenses of Transformative Innovation (TI) and Normalisation Process Theory (NPT). The chapter is organised in a similar way as the previous chapter. The first part outlines characteristics of PCM undergraduate medicine and a history of SBME implementation. The following section presents the Transformative Innovation that occurred including the factors influencing the implementation of SBME, which aims to understand the implementation processes in response to pre- and during the COVID-19 pandemic. Finally, NPT is used to enable an in-depth analysis of the PCM SBME implementation processes. This Chapter starts by providing an overview of the PCM in which SBME is practiced.

5.2 Phramongkutklao College of Medicine Case Study Report

This part of the chapter uses interviews and organisational documents to investigate the history of the Thai medical school with a specific focus on SBME implementation.

5.2.1 Context

PCM is considered as one of only a few medical schools producing medical graduates to serve both civilian and non-civilian healthcare services in Thailand. It is important for the learner to cultivate both physicianship and officership. Military medical schools offer military medicine alongside undergraduate medicine training, with the aim of supporting healthcare services in military and civilian-military cooperation operations, and, like other military medical schools, preparing graduates to serve the nation (Pock et al., 2013).

Scholarship and the associated civilian-military relationships provide medical education benefits and preventing learners from shifting their interest away and this can be seen as a competitive benefit for studying at PCM. To demonstrate what PCM has claimed, Institutional medical education outcomes require not only effective assessment methods, but more concrete evidence to prove that the outcomes are met. The face-to-face Objective Structured Clinical

Examinations (OSCE) has been the solution adopted for two decades. OSCE-based SBME utilisation is limited amongst clinical tutors and used primarily with mainly final year medical students. Face-to-face interactions were compromised during the pandemic and forced tutors to seek for effective medical education solutions.

5.2.2 The History of the Medical School and an Overview of the PCM UG Medicine Structure

PCM is a Thai medical school located in Bangkok, Thailand. Its responsibility extends to the delivery of healthcare services, particularly in the Armed Forces with a focus on healthcare systems and operations. PCM, supports medical provision by teaching knowledge and skills in clinical practices and military medicine (Phramongkutklao College of Medicine, 2015). PCM medical school was initially approved in 1973 and in 1975, the former Medical Cadet College became Phramongkutklao College of Medicine (PCM). PCM was initially designed for an intake of 32 male medical cadets per year, merely for the armed forces (Phramongkutklao College of Medicine, 2022), but as the country demands for more medical doctors in the rural areas has increased this figure has risen to 100 from both genders and also covers the civilian healthcare system (CPIRD, 2019). The 'embedding' and 'integration' of the undergraduate and military medicine in this medical school is a key element of PCM teaching and training, it does so by providing a collaborative network of allied healthcare officers across hospitals and the regions.

PCM is committed to integrated and outcome-based curriculum. SBME is also used for teaching and assessment which makes it an ideal case for this comparative study (Adamson & Morris, 2014). This change in Thailand was not just due to the changing landscape of healthcare services, but also the influence of international medical educational trends. New medical education teaching methods and small group activities were introduced to promote an integrated curriculum and reduce single discipline focus (Yamwong, 2006). Small group activities including SBME spread across six years in the current curriculum (see Figure 5.1).

As Figure 5.1 depicts, SBME has been used in two main sub-divisions, clinical (upper arrow in blue) and military (lower arrow in green) medicine. A similar structural distinction is seen pre- and during COVID-19 pandemic, SBME in civilian medicine functions for similar reasons as in other civilian medical schools, but as military medicine SBME teaching for specific exit learning

outcome. The clinical medicine component has a similar purpose to military medicine in that it is about creating routes to communities of practice, connecting and strengthening PCM undergraduate medicine. PCM SBME is, therefore, structured through two parallel routes towards two exit learning outcomes, clinical medicine (final year national license OSCE) and military medicine (Operation Petcharavut OSCE).

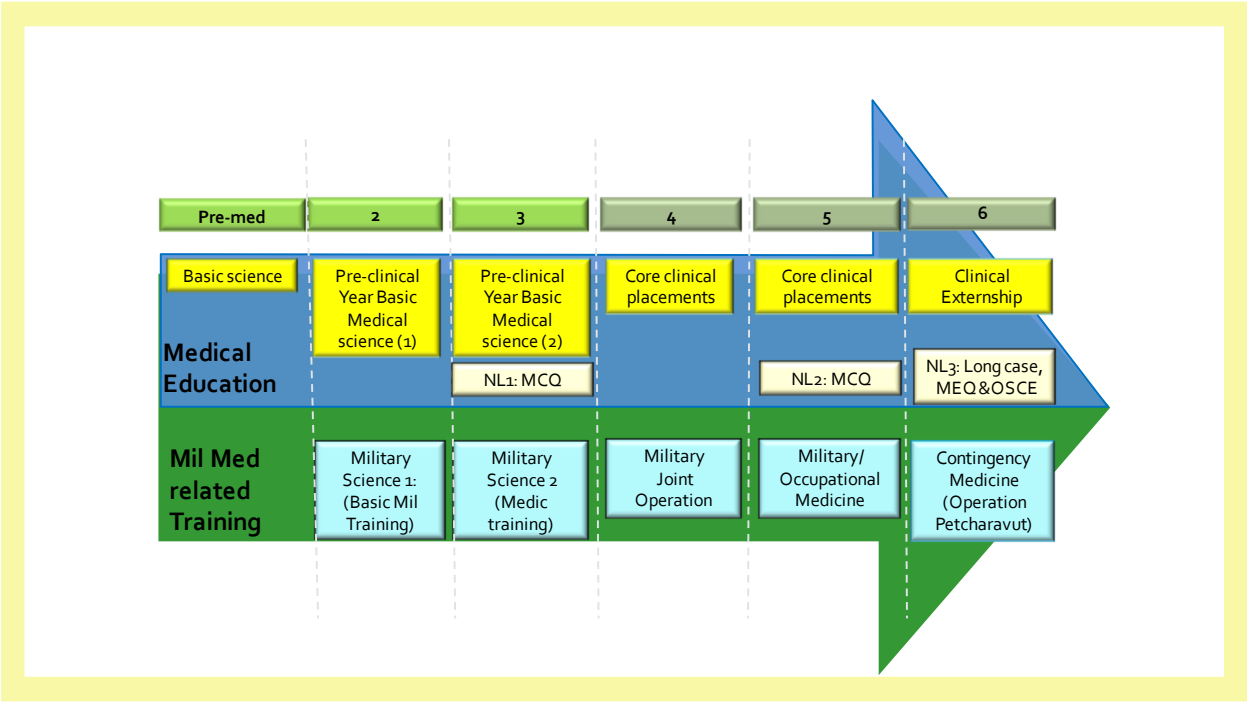
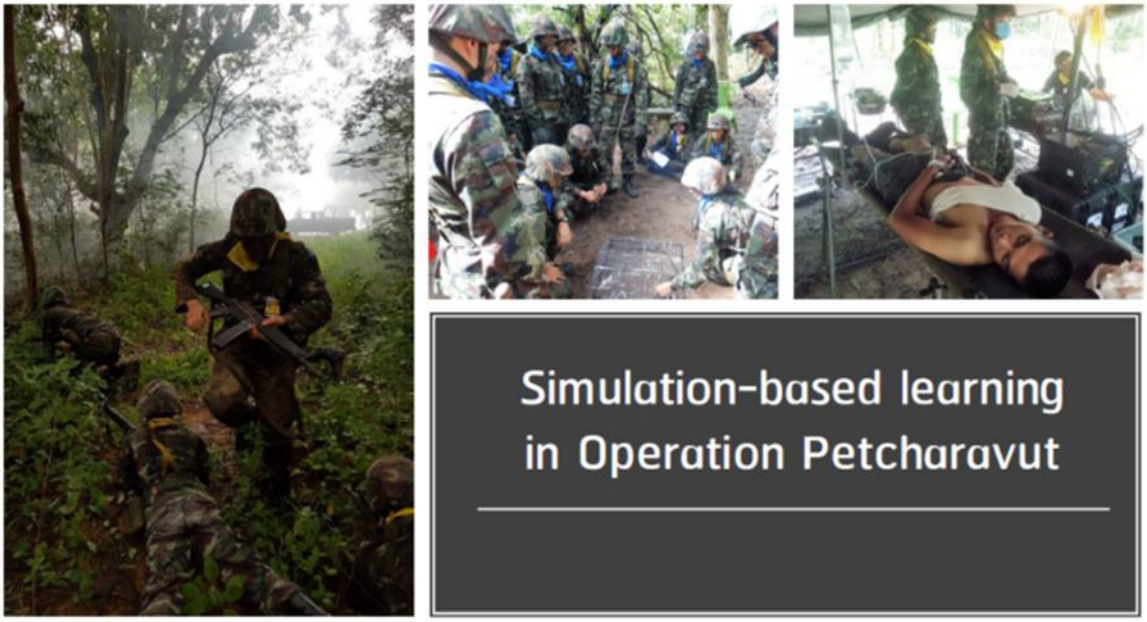


Figure 5.1: Areas of SBME Activities in the Current Undergraduate Curriculum

Source: Proceeding in PCM quality assurance

Previously, there was a temporary simulation centre which provided clinical learning for the undergraduate medicine programme, mainly for years 5 and 6, by linking the work of later years simulation to support the achievement of physicianship outcomes required, the summative assessment (National Licensing Examination 3) or Objective Structured Clinical Examination. In assessing offficership, military leadership and combat casualty care by using SBME, the field operations have been modified from earlier curricula and adopt a model that has been long used in military medicine curricula in the USA (Pock et al., 2013). SBME fulfills a similar role for the summative assessment (National Licensing Examination 3) and Tactical Combat Casualty Care (TCCC) in field operations called 'Operation Petcharavut' in picture 5.1

(Phramongkutklao College of Medicine, 2015). The latter examination is dedicated to assessing and preparing PCM graduates (see the end of arrow).



Picture 5.1: Simulation-based Learning in Operation Petcharavut (Left: search and rescue/Middle: plan for medical evacuation/Right: provide medical treatment in the simulated field hospital)

As the curriculum was designed without encompassing educational theories such as constructivism, the SBME was not systematically implemented (Grant, 2013). The dispersed implementation of SBME led to selective participation of UG medicine tutors. Figure 5.2 below maps the organisational structure and the locations of the tutors who have been involved in SBME teaching and participated in the interviews across the curriculum (The figure describes the PCM medical school structure, interviewed tutors' department are highlighted in red). The majority of the respondents are responsible for their own curriculum and SBME. A small cohort of SBME tutors were targeted for this study as they had more privileged scope and focus in terms of delivering SBME and influence over the resources and development of skills required. This involvement in design, resource utilisation, and SBME delivery is one of the factors that helps enable comparability between types of SBME tutors involved during pre- and during COVID-19 pandemic.

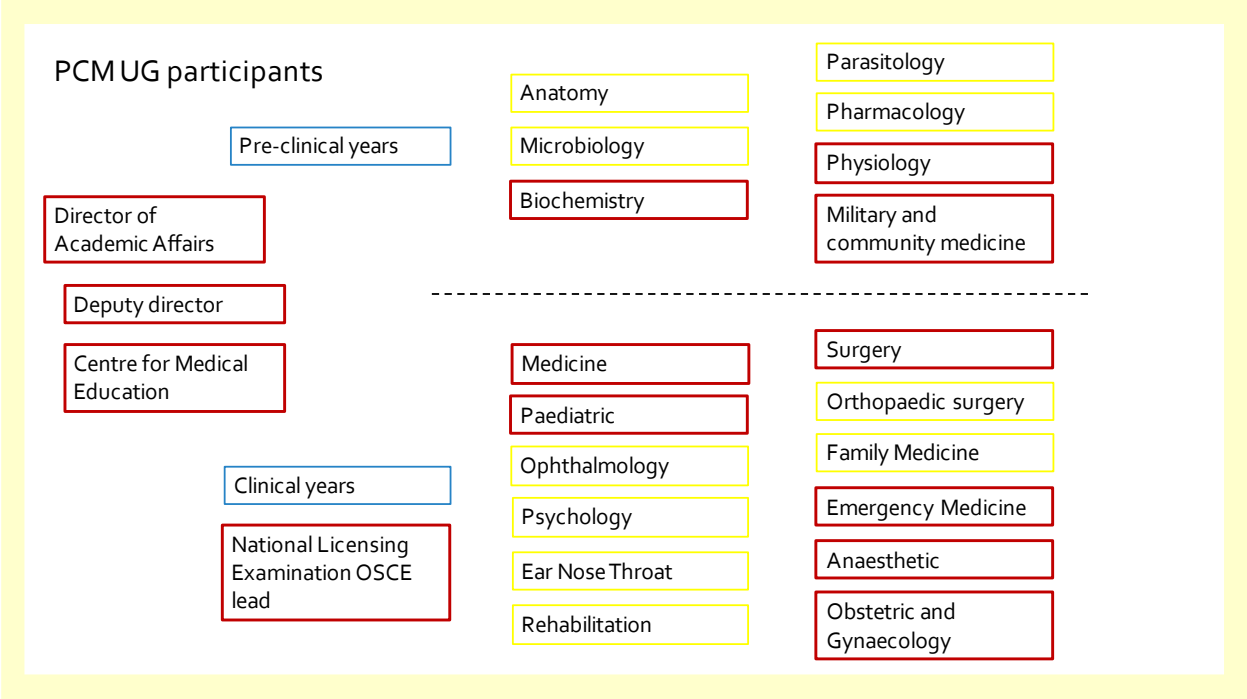


Figure 5.2: PCM Departmental Structure and Roles of Elites and Experts Interviewed in the PCM In-depth Interviews (in Red)

The SBME enables tutors to facilitate clinical teaching and learning towards the two outcomes defined as being either a medical or military doctor at the end of year six (Figure 5.1). PCM SBME has a physical and extended presence in the curriculum, a temporary clinical skills centre and simulated outdoor terrain for pre-COVID-19 SBME. The spaces were used for the medical school to deliver SBME practice and for the students to experience clinical scenarios related to both civilian and military-associated clinical practices. PCM SBME tutors were motivated by these specific issue concerned within the PCM curriculum (Phramongkutklao College of Medicine, 2015).

5.3 SBME Transformative Innovation in PCM Undergraduate Medicine

From the transformative innovation perspective (Leicester, 2016), SBME pedagogy used in PCM medical education was in part adopted while the traditional UG medicine was in place, mainly because of the need for support clinical teaching and the assessment of physicianship and officership identity formation but was revalued in the time of the pandemic. Factors related to each Horizon are explored and explained in the evaluation of SBME implementation and

innovation. These reflect the causal links and inform how the dynamic of local context has an effect on them (see visual presentation in Figure 5.3).

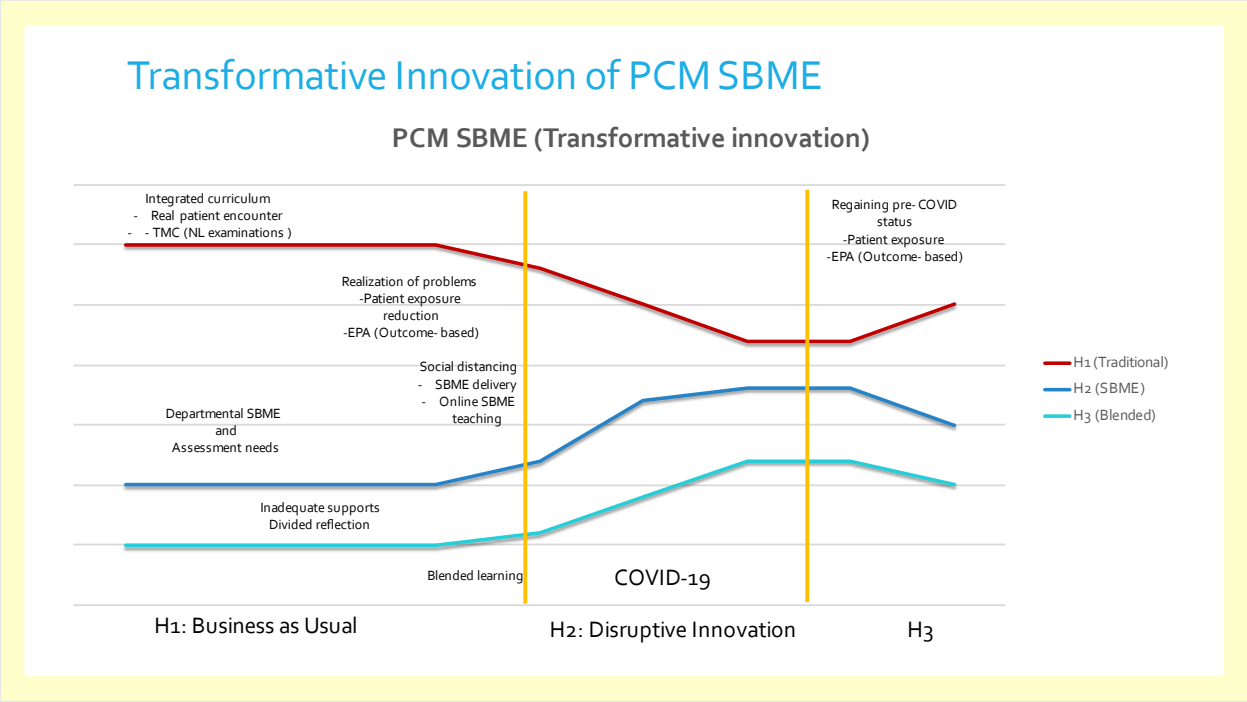


Figure 5.3: Visual Presentation of PCM SBME Implementation and Transformative Innovation

The three horizons framework offers insights into the dynamic of medical education changes. The process of PCM SBME implementation can be narrated through three horizons of innovation and the way in which SBME is visioned and played out towards the H3 horizon.

At the H1 horizon, PCM SBME refers to scattered SBME learning in undergraduate medicine specifically and is equally concerned with generating more specific military medicine outcomes assessment, of which military medicine is a part, rather than generally focusing on the whole undergraduate medicine curriculum. SBME's principles have also been used to help facilitate and develop military medicine leadership and casualty care skills, serving as an assessment tool for military medicine in the final year of undergraduate medicine for decades. Military medicine SBME tutors, in particular, are originally obliged to use SBME pedagogies as a way to prepare a medical officer who can perform in military operations as presented in the military medicine part of the enacted exit learning outcomes as:

> *"to have a leadership trait, military characteristics, and can perform as the head of a small military medical unit."* (Phramongkutklao College of Medicine, 2015)

As a result of the amalgamation of leadership and combat casualty care training, Military and Community Medicine as well as the Emergency Departments host regular SBME teaching events, where tutors and students come together to educate and train in leadership and combat casualty care skills in a safer environment, establishing and developing the foundations of the civilian and military doctor. The departments appear to be the main bodies to provide support for SBME workshops and to help other department staff with their practical and teaching skills development. These sorts of activities serve the beginning of SBME teaching recognition and uptake of training events that are available to students and trainees to improve their skills and strengthen the quality of teaching and the care of the military health services.

In PCM, SBME pedagogies utilise attributes associated with undergraduate medicine, such as monitoring student progress and assessing learning outcomes. The military medicine tutors have a degree of knowledge regarding SBME and are capable of assessing its teaching quality through the outdoor space in the middle of the simulated battle fields. This is an advantage over other medical schools which may take a more commodified approach to SBME pedagogies. It facilitates connections among experienced military medical officers, as is evident in the context of SBME teaching and assessment. As the field operation is delivered at the extended facility and required pre-hospital simulators and equipment, some essential pre-hospital simulation related resources, such as special SPs and moulage sets, are made available to accommodate the needs of casualty care simulations and to provide encouragements for learners to take advantage of training (Fletcher & Wind, 2013). The staff from Military and community medicine mentioned the basic SBME training and how they are trying to differentiate this training session from the emergency department as follows:

> *"We're planning to conduct our own workshop for moulage, SP and metaverse and trying to separate from ER basic sim training workshop." (Int Ref PCM1_2)*

SBME occurs between PCM medical education and can therefore be understood more as specific - tutor (task) - student(person) - environment(context) relationships, as the end customers of SBME are not only hospital-based healthcare, but also the battlefield military medical services. The establishment of relations of trust and engagement seem to be founded on a more collective but receiver-oriented relations as it is important for PCM teaching strategies (Chung et al., 2013). Chung et al. (2013) also claimed that local culture plays an important part in delivery of undergraduate medicine and in delivery of SBME to students and it is this aspect of relationship that distinguishes this Asian medical school SBME from other SBME teaching. As such, relations between tutors and students are a key part to learning in UG medicine and SBME, especially when debriefing was not always completed, and the learner is responsible for making sense of their experience. The interviewee mentioned an incomplete debriefing process:

> *"here we were not very knowledgeable and very much about sim. OK, that what we're going to do this today, let's see what the procedure is, let's see if the kids can do it or supervise them and then it's over, and then it's over, there's no link, there's no feedback, there's no reflection." (Int Ref PCM1_6)*

The receiver-oriented culture has received different attention to tutor-student relationships collectively when compared to Western countries. Trust and engagement for one another is a differentiating characteristic from other types of teaching that occur in the institution. This is captured by the elite interviewees who regard a more 'collective' and 'learner-oriented' tutor-student relation embedded as fundamental to their relationship and learning and teaching strategies:

> *"As for the knowledge, the decision is usually that it follows you on the team. To see your brothers (seniors) make a decision to order a lab, make orders, all these things is learning to work, which they won't see from simulation." (Int Ref PCM1_4)*

> *"When the covid pandemic we couldn't get the kids to teach physical examination, all we could do was we give the kids a series of videos, and then we let them learn, and then they showed us how to examine them, and this subject would be the people at home, parents, brothers and sisters. So this is another one that they can do. It's like parents are their back up." (Int Ref PCM1_6)*

This following section presents the structure of SBME in the PCM curriculum. Although military medicine SBME is a highlighted activity, there are SBME teaching and demonstrations with an increasing complexity, SBME sessions are dispersed and not fully aligned across the curriculum ranging from a simple procedural simulation to a complicated field exercise-based simulation. Teaching in each department is structured around individual departmental outcomes and the assessment related issues raised, particularly the national license examination including 1) step 1: one best response basic medical science in Year 3, 2) step 2: one best response clinical science in Year 5, and 3) step 3: modified essay questions, clinical examination and manual skills (OSCE) in final year started in 2006 (Yamwong, 2006) . Each of these scenarios has a set of learning outcomes which enables students to identify their learning opportunities but not aspects that should be revised or improved in order to move to the next level.

Table 5.1: SBME Distributed across Six Years

Year	Context and Learning outcomes
1	None
2	None
3 (Community Survey interview)	You are a third-year medical student conducting a community survey Task: - Introduce yourself and the interview process - Demonstrate waist circumference measurement
4 (community research)	You are a fourth-year medical student asking for informed consent Task: - Demonstrate asking information for consent - Demonstrate obtaining the informed consent
4 (Mil med)	You are a combat medic sent to support military operations Task: - Demonstrate basic care under fire - Demonstrate basic tactical field care - Demonstrate basic tactical casualty evacuation care
5 (ACLS)	You are an intern in a community hospital Task: - Evaluate signs and symptoms of cardiogenic shock - Demonstrate treatment with proper medication and appropriate procedure - Discuss differential diagnosis - Understand ISBAR consultation and transfer
6 (Mil Med)	You are a medical officer sent to support military operations Task: - Demonstrate advanced care under fire - Demonstrate advanced tactical field care - Demonstrate advanced casualty evacuation care
6 (NL)	You are a medical doctor attending out-patient department Task: - Demonstrate taking a focused history and examining affected parts - Discuss differential diagnosis - Discuss two most appropriate investigations

Source: Documentary analysis (Study and assessment guides)

The combination of traditional knowledge overload and the outcome-based curriculum has demonstrated its uniqueness in how PCM handled its **second horizon** (pandemic situation) as the national license examinations as outcomes to be measured remains in place. The mix of 'collapse and recovery' and 'capture and extension' scenarios described by Leicester (2016) was identified in PCM SBME implementation. This existence of OSCE in national license examination

enabled mainly the final year SBME implementation. The re-emerging SBME was adopted and modified to replace the social interactions lost as a result of social distancing related strategies. These can be explained as PCM SBME implementation had historically failed but the pandemic highlighted the importance of SBME and the role it could play in replacing clinical, social interactions. Innovative SBME which was re-designed and resulted in smoother transitions through undergraduate medicine during social distancing period. The nature of the disruption and social distancing strategies gave PCM tutors an insight into what had been emerging in the global medical education system i.e., it demonstrated the role of SBME as a result of the pandemic. An example offered by one tutor was,

> *"Some sim-based concepts were deployed interms of SP (Simulated Patient), some are family members who let students practice on history taking or physical examination or even OSCE. In the ortho department, they had students perform procedures in five minutes with the teacher watching the camera. They may not be called innovation as it was forced to find solutions. These would not be a classical SBME because we didn't do a debrief at the end." (Int Ref PCM1_15)*

Although outcome based SBME appeared to be a long-term implementation goal in PCM**, H3 or the third horizon** of SBME, which was assumed to grow from the activity during the pandemic, appeared not to align with the PCM H3 vision. COVID-19 disruption (reduced interactions and patient encounters) emerging in the H2 systems were perceived to slightly increase the value of SBME in the curriculum. However, perceived value remained focused on real patient encounters. One elite interviewee commented on the situation:

> *"I still believe that if everything comes back, the building will be used. Now we encourage everyone to use it, but it has to be infrastructure, there must be a scenario, and then each group can develop from here. There may be a lag period before we get an example of sim-based use." (Int Ref PCM1_15)*

The following sections explore the patterns of relationships that illustrated the PCM outcome-based curriculum journey from Horizon 1 to Horizon 3. The data is then used to describe the nature of PCM SBME and the process of implementation and innovation during Covid-19 transitions that displayed the capacity to adapt in the PCM undergraduate medicine.

5.3.1 H1: PCM SBME – Part of a Business as Usual?

This section explores the structure and organisation of PCM SBME. Specifically, it investigates a differentiation between pre- (policy influenced) and post Covid-19 pandemic. This leads to the understanding of SBME implementation and influences including contextual healthcare and medical education factors. The following key components emerged from the interviews and the documents studied are explicitly demonstrated in Figure 5.4 and explained PCM SBME characteristics in the subsequent sections.

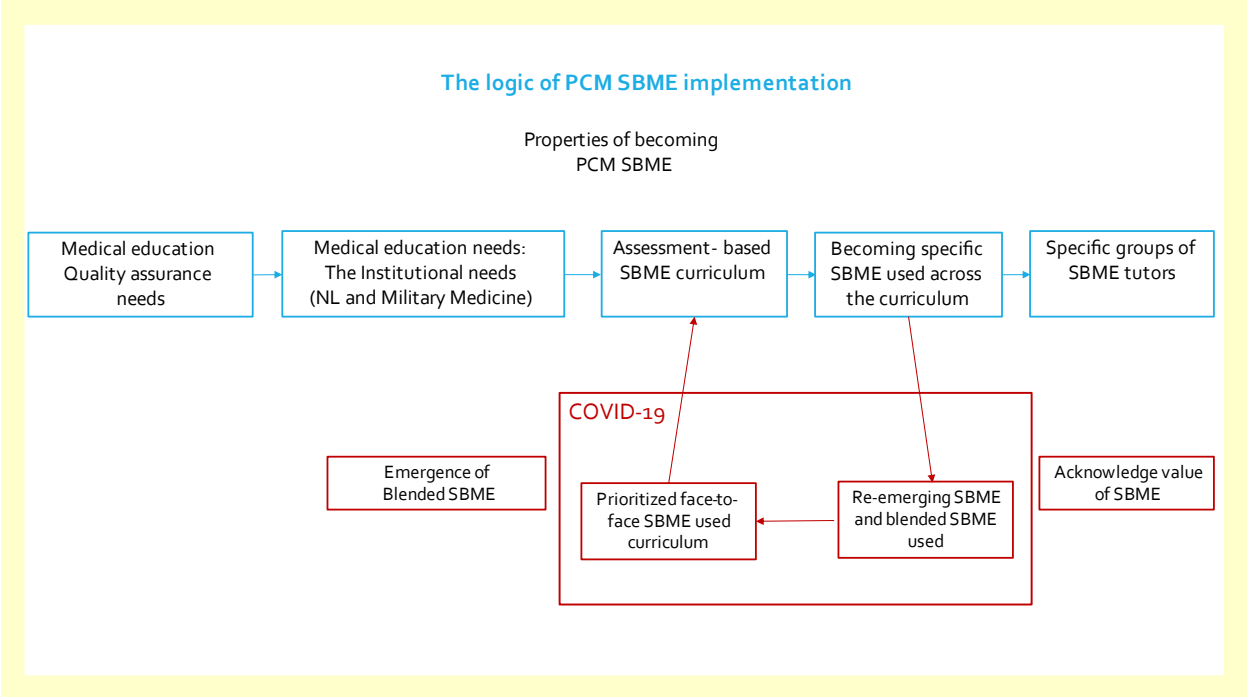


Figure 5.4: The Logic of PCM SBME Implementation

Global medical education trends, such as an integrated curriculum, small group activities, national license examination and quality assurance, have had an influence on the Thai medical education system (Yamwong, 2006). These trends have been recognised and adopted by the

Office of the Higher Education Commission and the Medical Council of Thailand (TMC) (Ministry of Education, 2018). At PCM, recognition of integration in the curriculum appeared to be explicitly evidenced in 2008 (Medical Education Unit, 2016).

As mentioned, Thai undergraduate medicine curriculum has changed its landscape to meet national and international requirements, and to introduce national license examinations. In 2012, the TMC and the Consortium of Thai Medical Schools (COTMES) initiated a process of undergraduate medicine curriculum change and updates based on international standards. Later in 2017, TMC recommendations required Thai medical schools to re-accredit their curriculum to meet the World Federation for Medical Education (WFME) Global Standards for Quality Improvement, the 2015 Revision (The Medical Council, 2017). In response to TMC requirements, Thai medical schools paid attention on how to meet the standards rather than to finding solutions for current and future healthcare and medical education needs. The recommendations were made explicit that:

> *Our aim is to have a scope for accrediting and re-accrediting undergraduate medicine curriculum to meet the international standards required for medical education (the World Federation for Medical Education, Basic Medical Education WFME Global Standards for Quality Improvement, The 2015 Revision).* (The Medical Council, 2017)

These responses on standardisation did not explicitly promote the development of SBME for teaching, but proposed flexible teaching options for students and the institutes to meet medical education requirements (Phramongkutklao College of Medicine, 2015; Yamwong, 2006). Unlike other medical schools, PCM curriculum has to explicitly deliver military component in its curriculum against the National Defense Studies Institute (NDSI) requirements (National Defense Studies Institute, 2018). NDSI (2018) states clearly that PCM is one of the Armed Forces educational Institutes that require their students to develop both leadership and professional identities and ensure their knowledge is applicable in their practice. As attention is paid to outcomes in relation to military medicine and healthcare operations, experience of military

medical operations and combat casualty care are believed to fulfil the PCM and NSDI requirements.

The idea of SBME arises in other policy documents, such as Undergraduate Medicine Standards and Qualifications Frameworks which highlight 'practice in simulated setting' as one of the teaching tools medical tutors are encouraged to utilise (Ministry of Education, 2018). In this qualifications framework it is stated, that either 'practice in simulated setting' or 'practice under supervision' can be used interchangeably in procedural teaching in the context of allowing the students to be able to practice in order to get the medical license from the medical council.

> *"For medical procedures, each institute must arrange either 'practice (in real setting) under supervision' or 'practice in simulated setting' according to what required by the Medical Council."*(Ministry of Education, 2018)

A number of themes emerged from the interviews and documents exposing characteristics and factors that influenced the implementation and innovation of PCM SBME (Table 5.2).

Table 5.2: Themes and Sub-themes Identified for Pre-COVID-19 PCM SBME and Broad Definitions

Themes	Sub-themes	Explanation
Emergence of Institutional Needs	Institutional identity	This theme highlights the emergence of institutional SBME need identified.
	National License Examination	
Emergence of institutional outcome	Identity formation	This theme points out the emergence of outcome-based curriculum defined in PCM context.
	Outcome-based curriculum	
Emergence of Departmental SBME	SBME for Military Medicine	This theme highlights the emergence of enacted departmental SBME curriculum strategy.
	SBME for Clinical Medicine	
SBME as New Teaching Practice	Departmental use	This theme revolves around the idea that departmental-based has influenced implementation of SBME and the roles that assessment plays in addressing needs
	Departmental understanding	
SBME Interests Recruitment	SBME interests' identification	This theme focuses on how SBME networking unsuccessful in PCM.
	Undervalued SBME	
Local Medical Practice Connection	Departmental interests	This theme reflects how tutors define awareness of the importance of collaboration
	Medical school and hospital collaboration (departmentalisation)	

5.3.1.1 Emergence of Institutional Needs from Qualifications Frameworks

In the Thai medical school SBME setting, specific healthcare and medical education needs as well as the underpinned qualification frameworks played a critical role in shaping medical education practices. Exit learning outcomes identified by undergraduate medicine (national license OSCE) and military medicine (field operation) examination were perceived to be fit for

SBME purpose and adopted, especially the national license examinations. Military medicine, local health care and local medical practices, was amongst the medical school assets prioritised for UG SBME teaching. These can also be understood as usable learning material for determining the outcome-based curriculum embeddedness. These double-sided outcomes shape how participants create and share an understanding of SBME across the participants' interview.

Participants described a divide between SBME understanding and the practical realities of delivering on target outcomes in PCM undergraduate medicine. In the data, participants participating in PCM undergraduate medicine and SBME expressed their opinion and experience that the SBME, particularly military medicine component, requires a dedicated simulated teaching environment. One of the interviewees expressed the opportunities that SBME, when utilised in a suitable facility might offer for military medicine:

> *"Some situations are really difficult to be trained in real settings. It's necessary to simulate it so that people who have to work or can work in stress situations, and there are many problems in front of us during stress. It needs training, it's not using only knowledge, it's skills related, it's mindfulness. It needs training." (Int Ref PCM1_4)*

The pre-COVID-19 SBME healthcare context allowed tutors to differentiate SBME through an on-site and face-to-face approach in the departments those specific social interactions occurred between students, learning processes, and learning spaces were considered important. While military medicine demonstrated specific SBME requirements, undergraduate medicine SBME did not receive favourable appraisals. In the Thai medical and healthcare landscape practicing on real patients under supervision in clinical teaching appeared to be the preferred approach over SBME. The reduction of subject patients during the pandemic arguably made the tutors realise and reflect on the need of SBME:

> *"We didn't have many (SP) at the time, there were about 10 simulated patients circulating, one set used about 10 of them and kept changing the*

scenario. Here, when there's COVID, we need more patients because 10 aren't enough because this individual kid (student) needs to report one case a week, or interview and examine a few patients." (Int Ref PCM1_6)

This reflected that SBME was not valued for undergraduate medicine teaching during pre-COVID period. Participants repeatedly cited their awareness of case-based and problem-based teaching as their main integrated activity and clinical teaching for early years (in interviews), the pre-clinical year tutors in particular described integrated learning used prior to the pandemic:

"Normally, when we deliver teaching it is not only to listen to lectures, there is also a discussion, the tutor will give a case or scenario and ask for opinions from students, why do you think this? What makes you think like that? This is working well onsite, when online it does not work at all." (Int Ref PCM1_1)

A constructivist approach was not used to distinguish PCM SBME. Although healthcare service needs and medical education outcomes in undergraduate medicine delivery were identified, constructive alignments were not structurally apparent in the curriculum. For example, the end of final year national licensing OSCE displayed evidence of 'complex' SBME, but there was no indication of the connection with the early years' sessions in this medical school. These are areas that appear to more loosely align with progressive learning outcomes but are placed where the institution is required to demonstrate a stronger association with specific qualification frameworks.

From the model derived from the interview data (Figure 5.5), tutors located there are at an advantage in terms of manageability of each individual departmental outcome-based curriculum strategy rather than the spiral outcome-based curriculum. This advantage relates to educational strategy associated with an outcome assessment focus and the PCM departmentalisation context. The key point here is that when assessment cues draw upon the practical nature of PCM departments and their responsibility for SBME, SBME tutors in areas of more specific component related utilise particular contextual attributes as parts of PCM undergraduate medicine curriculum. This enables them to operate an outcome-based

curriculum strategy that makes use of SBME and strong linkages between specific learning outcomes, SBME teaching process and specific learning environment. The interviewees commented on the assessment-based SBME approach as the SBME used is linked to national requirements:

> *"It's mostly about how we simulate it using a surgical device and a simulator. In the pre-COVID period, TMC was only primarily concerned about the procedures required for our 6th year to be competent in before graduating. The surgical department is responsible for evaluating 5 procedures, which is the basis that needs to be achieved at the end." (Int Ref PCM1_5)*

The departmentalisation also led to the confinement of SBME implementation within each individual department:

> *"In our emergency setting, I did not know how Medicine educators taught our students, but that if it were us, we would focus something about shock and resuscitation." (Int Ref PCM1_1)*

The relationship between these contextual factors is depicted in figure 5.5 which illustrates how context underpins the analysis of SBME implementation. Similar to the implementation processes, the factors interact in a non-linear format. Overall, specific needs influenced (and were influenced by) departmental needs. In both directions, these influences shape tutors' teaching and learners' learning towards implementation. A sense of specific departmental needs shapes a departmental implementation. Such implementation is often operationalised by departmental tutors and the relationship of task, learning process and specific simulated environment (an OSCE-based national licensing examination and a military field operation) rather than through adherence to a simulation centre (see Figure 5.5). Lack of shared constructive alignment, departmentalisation and non-systematic SBME embeddedness triggered the departmental implementation in PCM.

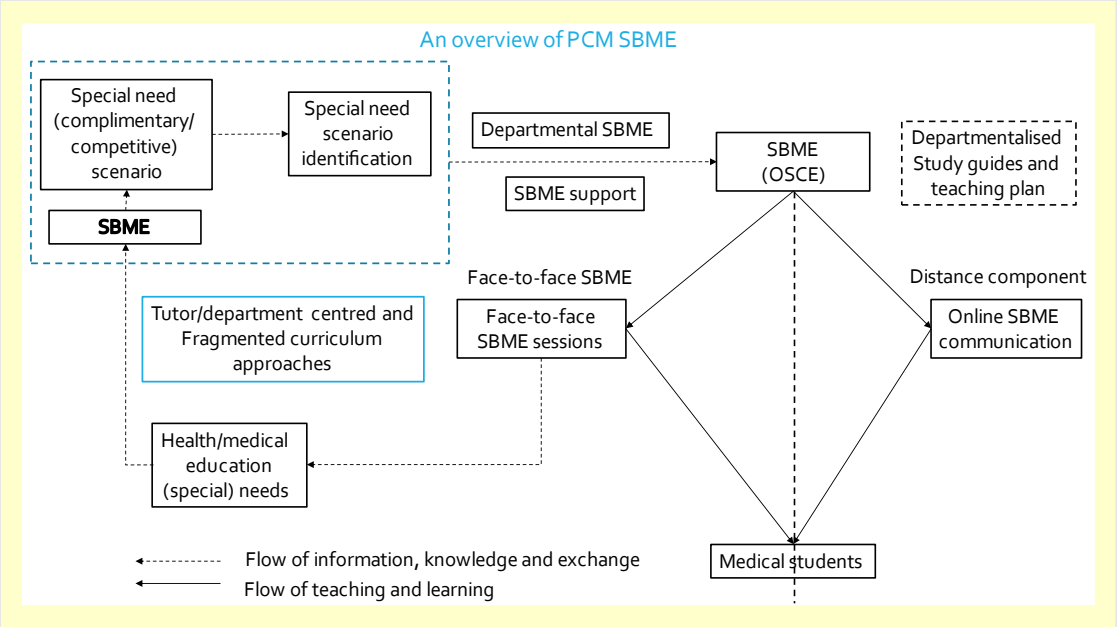
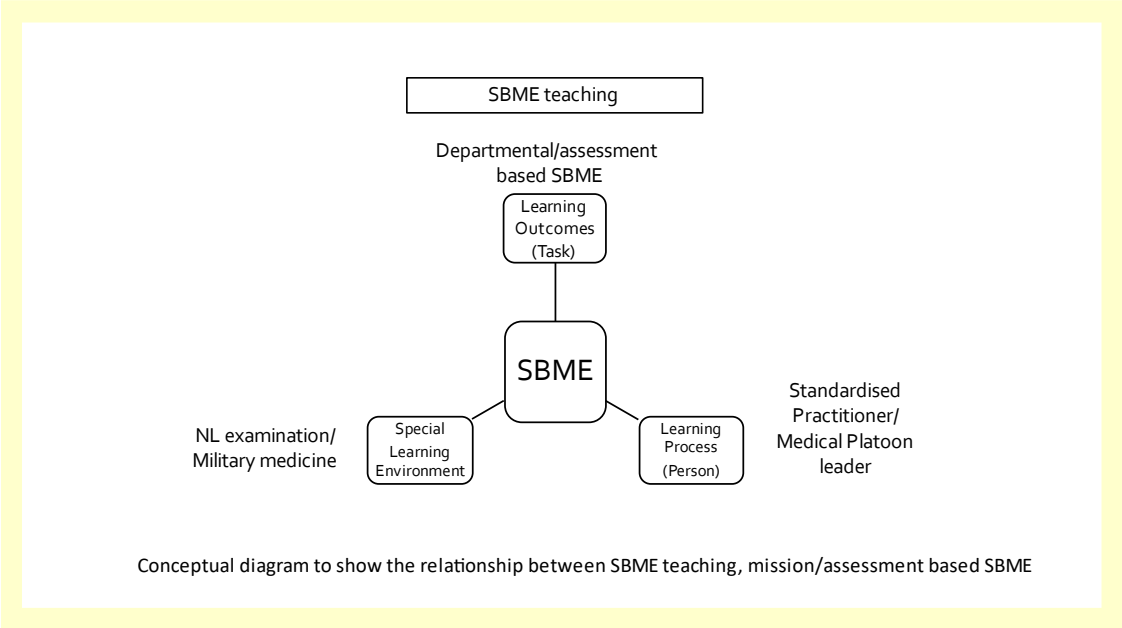


Figure 5.5: An Overview of PCM SBME

PCM SBME knowledge and skills depend upon specific learning outcomes and medical education resources availability that tutors engaged in teaching practice are able to capitalise on. Specific medical education requirements are necessarily utilised or communicated where there are concerns associated with the contextual qualifications' framework (e.g., national license examination and military medicine performance). As the outcomes of UG medicine and military education are defined differently, assessments for qualifications are identified and constructed as a means of different SBME (Figure 5.6).

Pre COVID-19 SBME used in PCM presented greater opportunity for individual students to embody practice in clinical and military medicine, if only through acts of practicing in the clinical setting and assess in both clinical and simulated settings. Instead of the whole learning processes, SBME has a unique role in communicating particular learning experiences associated with a particular unique department. Crucially, the preference of SBME tutors' who are able to communicate notions of outcome-based curriculum and embed SBME with value-laden information, is making use of medical practice for specific institutional outcome identified and assessed. One of the interviewees referred to assessment processes:

"assessing the medical student, it must be an actual evaluation of the patient's rather than looking at the score as the kids will go and look at the old exams' outcomes to be assessed that are not correct." (Int Ref PCM1_5)



Conceptual diagram to show the relationship between SBME teaching, mission/assessment based SBME

Figure 5.6: Conceptual Diagram Demonstrating the Relationship between SBME, Constructivism and Constructing Difference in SBME

The following section will discuss why SBME became necessary while practice in real clinical settings is valued over SBME.

5.3.1.2 Medical Education Needs: Assessment and Identity identification

PCM SBME is believed and valued by PCM tutors as it is legitimised in the context of periodic assessment and military medicine in particular. It is influenced by the growth of OSCE assessment. Military medicine identity formation and the decision-making that promotes activation of SBME teaching have initiated collective efforts through which SBME was implemented. In this case study, the initiation of assessment (OSCE) based SBME fulfills the institutional needs. The delivered sessions provide relevant information to support the achievement of particular outcomes to be measured. This is the model deployed, using an assessment-based approach with a responsible department coordinator and identified SBME team. Pre-COVID 19 PCM SBME led the students to navigate towards the attainment of the exit

learning outcomes to be assessed and illustrated what an individual department is required to achieve. This interviewee pointed out what her department is responsible for and areas where SBME may be involved.

> *"After COVID, the 4th year student is starting to use this EPA. The obstetric dept is responsible for the vaginal packing, amniotomy, pelvic examination and normal labour." (Int Ref PCM1_7)*

The result presented here supports the assertion that there are two broad 'types' of SBME pedagogies in operation in this Thai medical school. These can be best understood using the terminology of 'assessment identification' and 'identity identification'. To some degree, the most prominent SBME sessions organised as an assessment tool are used for 'identity identification', as they seek to deliver and examine experiences based on the emergent professional identity. This is where students can demonstrate the mastery of certain operational skills reflecting the needs of the communities they will serve, civilian and military communities. The rationale for this is stated clearly in both TMC (Ministry of Education, 2018) and DNSI (National Defense Studies Institute, 2018) qualification frameworks. The DNSI stated one of the expected learning outcomes of an individual cadet:

> *"demonstrate an effective platoon-leader level military unit commander in an active combat operation with a basic knowledge of their own profession in their early year of service." (DNSI)*

Some of the tutors demonstrated considerations beyond their responsible SBME teaching identified as they were engaged in a variety of SBME. This provides an indication that although they have assessment to measure (summative assessment), they are also active in participating in new teaching and assessment activities in the curriculum. This is because current curriculum strategies are not about keeping the outcome linked to SBME across the curriculum but rather are more focused on assessing more skills required with SBME encounters to promote the use of the new simulation building and these require more than departmental level investment in specific resources and capabilities. There was encouragement to use the new simulation centre

but there has been a lesser degree of control over the entire curriculum as mentioned by one elite interviewee:

> *"It can't be said that all departments doing sim because the most used is the emergency medicine. Pediatric also uses it, but doesn't use it in as full a way as emergency medicine. This year's Medicine or Surgery, I think they probably did not use." (Int Ref PCM1_15)*

Therefore, a departmental and specific SBME system offers an alternative and a more practical choice where students can practice their skills in a manageable way and is effective for individual responsible departments. The departmental outcome identification and outcome construction are not directly involved in creating links to exit learning outcomes but in demonstrating increased complexity of clinical teaching across disciplines and across six years. SBME tutors regard their outcome-based curriculum strategies as a driver that inspire them to value on SBME prior to and during the pandemic. As a result of the national licensing examinations and Entrustable Professional Activities (EPA) introduced as required by the current curriculum in 2020 during the time of pandemic, the tutors commented on the EPA application and the use of SBME as:

> *"The obstetric department is responsible for the vaginal packing, amniotomy, pelvic examination and normal labour. These skills need to be demonstrated at the OPD or at the delivery room, and then let the teacher see or maybe practice with a mannequin or something like this." (Int Ref PCM1_7)*

The situation whereby tutors involved in teaching either practice under supervision or practice in a simulated setting is driven by the assessment and institutional outcome needs to be delivered and made explicit. As a result of departmentalisation, the tutor's choice is to be from a particular background and perform teaching for a particular discipline. As tutors of established disciplines have to run the course, the availability of subject patients has an effect on the types of teaching that tutors engage with and also determines the meaning and level of

outcome-based curriculum strategies they pursue. The next section explains how the tutors determined what to be used and engaged with SBME.

5.3.1.3 Emergence of PCM SBME

Assessment-based SBME implementation is the SBME in which tutors primarily perform summative assessment based on learning outcomes identified which is an institutional requirement. The document data revealed that dispersed enacted SBME curriculum comprises mainly of resources or procedures for particular departmental SBME assessments (Table 5.1). The way tutors and students interact with enacted SBME indicates how SBME are delivered as assessment tools in the current fragmented SBME practice. When implementation is departmental, individuals tend to focus on individual departmental learning objective sets as well as how to ensure departmental SBME effectiveness, as described in one interview:

> *"We did not ask other wards, because, the first one, the existing curriculum is not an integrated curriculum, and each department would like to work in their own scope. In our emergency setting, I did not know how in Medicine educators taught our students, but that if it were us, we would focus something about shock and resuscitation." (Int Ref PCM1_1)*

During data collection, the pattern of these departmental outcomes resonated with existing OSCE based SBME for preparation of doctor and armed forces officer, mainly, the medicine (practice) and military medicine practice (see Picture 5.2). This illustrates that PCM SBME are constructed to assist the medical school to be able to evaluate their particular outcomes to be assessed and not actually to assist students graduated progress. 'Assessment identification' is used because much of the SBME growth in PCM has occurred as a response to the national licensing examination (OSCE) and military leadership assessments that the institution requires and also the shortfalls of exposure to specific scenarios in medicine and military medicine. As such the majority were designed to have OSCE based SBME approaches in terms of assessment, and it is therefore useful to understand characteristics of SBME as they determine what is to be measured (Appendix 7 demonstrates the patterns of SBME used at PCM).

Unlike spiral curriculum strategies, tutors often indicated they had seen sessions with adherence only to specific groups of learning outcomes (identity) but did not indicate how learning should be mapped and aligned in the process of outcome construction of both undergraduate medicine outcomes and military medicine identities. What was written in the study and assessment guides was used as students approached and engaged in isolated sessions demonstrating to stakeholders that there were issues to assess and achieve within the set(s) of sessions. The greater complexity of an individual SBME session was seen in the higher years, but continuity within and among departments and progression across the years was not. One of the interviewees described lack of continuity or hand-offs between departments:

> *"That's the main problem which we don't have. I have never seen when they are teaching, so I do not know what the real problem is or what the other departments have." (Int Ref PCM1_1)*

Another tutor reported on the challenges of vertical integration within the department:

> *Within my department, I used to ask my colleagues, should we have a meeting? 4-5-6 tutors. Our 6th year tutors never told what they needed from us (4th year tutors) and this was even harder when we asked our 3rd year tutors. (Int Ref PCM1_3)*

The PCM outcome-based SBME resonated strongly with the student assessment revealed by this component of the research. The data supports the conclusion that simulations have been used to assess competence of the medical students (Shumway & Harden, 2003).

This assessment-based approach without reflection and feedback component combined explains why the spiral trends do not exist. This incompletion of SBME process perhaps derives from a lack of promotion and support in terms of the understanding of SBME and the constructivism learning theory underpinned. One of the SBME elite reflected:

> *"Before, here we were not very knowledgeable much about sim. OK, that what we're going to do this today, let's see what the procedure is, let's see if the*

kids can do it or supervise them and that's it, and then it's over, there's no link, there's no feedback, there's no reflection. Actually, these things are actually going to be useful, so try to get the teachers to learn here. These are what we're trying to slowly expand." (Int Ref PCM1_6)

This reference to spiral SBME being less known in the Thai medical school arguably accounts for the specific utilization of SBME in the undergraduate medicine curriculum. Although spiral SBME does align with either training for clinical skills or military leadership, it may not meet the need of UG medicine in this particular non-constructivism context where SBME influencing the specifically assessment-based SBME in this medical school where patient encounters are valued. Some of the clinical tutors refer to this preference by citing the real patient encounter as a reason for the strong presence of clinical rather than simulated practice remaining dominant in the local medical education context. This reinforces the lack of SBME implementation due to stronger emphasis on practicing in clinical settings in the area. The tutor reflected:

"I do both central line insertion and cutdown. It's hard every time. It's not as simple as students think that because they never actually do it, only train and take exams with dummies in year 6. I told them we have patient subjects from entire hospital every day. Our surgical team has an advantage in the operating room before the operation. It doesn't hurt when they fall asleep, why don't we ask for a jab in one. It will be a good experience, and the patient will not be burden because he's already asleep, but no one's (student) going to take an opportunity." (Int Ref PCM1_4)

Tutors also comment about having "the simulation centre" in place is important as they feel currently unable to provide appropriate support for promoting the use and delivering PCM SBME. These comments also indicate that there is an overlooked relationship between emerging SBME networks and innovative SBME teaching. This unlocks ideas about the reasons why some disciplines display a less degree of SBME. This is not just about resources and a

diverse discipline base that is a determinant of more SBME, it is understanding of SBME and accessing these resources that is a defining the way tutors value SBME and the centre.

> *"This simulation centre is not supportive for users. If I have to travel from here (OBGYN building) to ER building to use, I have to inform them earlier and I have to prepare and plan. This means that one session for SBME I have to do many things myself including re-setting the manikin. This is not user friendly at all." (Int Ref PCM1_3)*

As mentioned, the value given to SBME plays an important role in the development and implementation of SBME. This suggests that being able to access and connect when teaching with real patients in healthcare and medical education contexts is an important hurdle for the SBME implementation. In addition, medical schools such as in this current chapter with 'less developed and normalised' SBME activity, implies that there is a certain patient encountering 'culture' or 'practice' in these areas where either students or staff values are less on SBME with weak linkages to simulated learning environments and processes associated with SBME teaching. In this regard, notions of normalization during pre COVID-19, SBME pedagogy and outcome-based approach which are regularly used to define quality in medical education cannot be conceptualized as a form of a new dominant system that the medical school draws upon to promote teaching.

It is unsurprising that simple face-to-face and assessment based SBME are the most common form of SBME, as the physical capabilities of SBME tend to be most easily supported in undergraduate medicine (see Figure 5.7). Although existing PCM SBME sessions do range from simple procedural SBME demonstration to the field operation (tactical combat casualty care) exercise simulation, they do not demonstrate the needs of SBME across the curriculum. Figure 5.7 begins with providing an overview of the SBME upon which the simulation centre was unavailable. The student development (i.e., pre-clinical and clinical separation) is then used to explain the departmentalization and fragmentation of the SBME used. The departmental outcomes are identified and reflect assessment-based SBME needs. The incomplete SBME with

partially incorporate reflection and feedback indicated that the SBME is used as seeking value for assessment rather than value for student-centred learning.

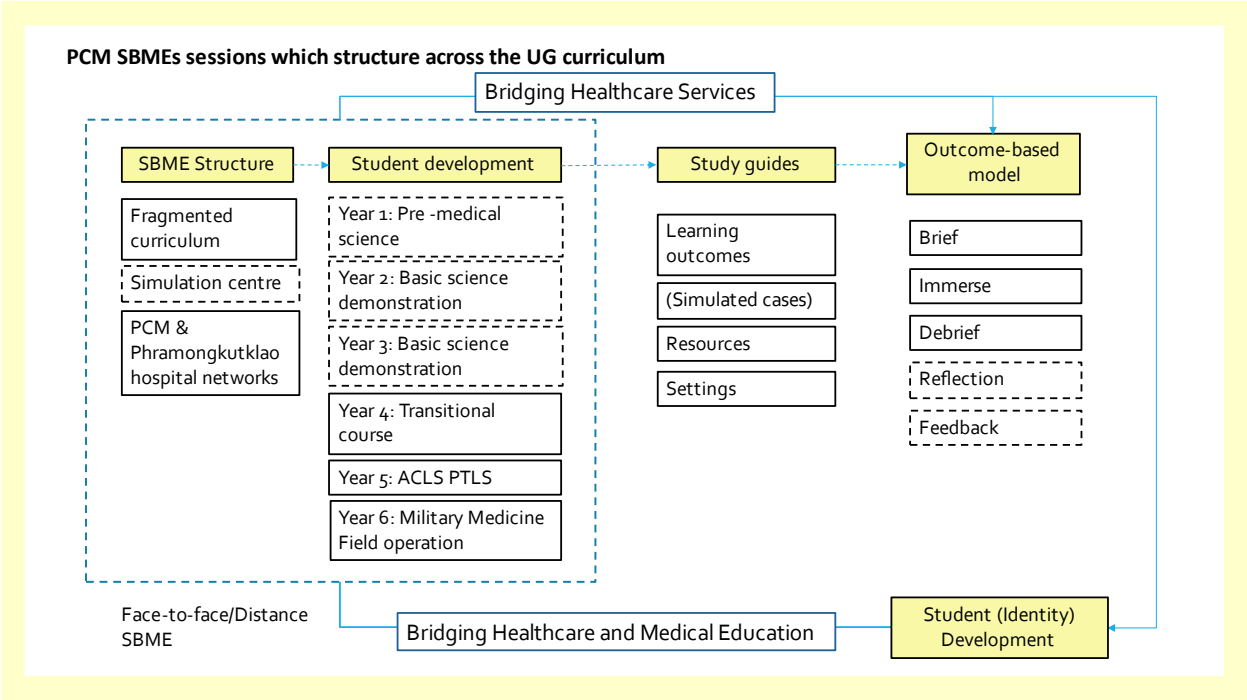


Figure 5.7: SBME sessions which structure across the PCM UG curriculum

These factors partly explain why SBME is specifically implemented at PCM. There are factors in relation to the different perception of UG medicine tutors toward SBME which are described in the following sections.

5.3.1.4 SBME as non-dominant Teaching Practice (both Preclinical and clinical year SBME)

The types of SBME that PCM tutors used, pre-COVID-19 period, were typically 'face-to-face' SBME, whereby relationships with students occurred on a face-to-face basis. As the simulation centre was temporarily operated, face-to-face SBME were required often to be conducted for departmental convenience as a way to support departmental needs. There was also evidence of tutors as clinicians engaging in more complex SBME in the clinical year SBME rather than in the early years. It is likely that the majority of tutors often engaged in SBME are clinicians with SBME experiences as stated by one of the SBME trainers:

"Clinical educators don't have much trouble. The problem is at preclinical side because they haven't seen and used SBME." (Int Ref PCM2_1)

Additionally, PCM SBME differed from traditional teaching and real patient encounters because of the way the knowledge was transferred and assessed at the point of interactions, but this did not support the requirement of a student-centred approach as the tutors often overlooked the importance of individual student self-reflection and constructive feedback. This awareness of student-centred teaching and student progression was not directly encapsulated, receiver oriented and inconsistency in feedback approach, leaving the learners to make sense of what being said by themselves (Chung et al., 2013), can be seen in the following statement (from one of the most advanced SBME tutors in PCM):

"… after teaching, we think that the student will have to be able to give advice on how to breast feed. But we may use different methods of feedback as we cannot do it with each individual. However, everyone will gain experience by finding a volunteer of the group, then use SP as demonstration, and then give that advice there. This is what was done before Covid." (Int Ref PCM1_7)

This highlights the continuity of the dominant 'conventional' teaching as it was shaped by knowledge overload and the existing outcomes set for the national licensing examinations. One tutor, when asked about the SBME used, reported that SBME positioning was not an essential part of learning process in the early years as the focus of outcome identified is linked to MCQ and MEQ examinations: the assessment required:

"First, beforehand year 4, there were no OSCE exams, so it would be more focused on the theory than practice. The test will be the format of MCQ to MEQ." (Int Ref PCM1_3)

The normalisation and quality of the SBME is not well valued because SBME is only supplied in some areas in this Thai medical school. Given that the focused SBME is largely embedded in procedural skills assessment without constructivism, it limits tutors from establishing their own constructive alignment strategies. This led to an overlooking of constructive curriculum

strategies. This type of SBME could be classed as ‘assessment focused SBME’ because the SBME are utilized more as assessment tools by tutors who primarily seek ‘value for assessing’ than ‘value for learning’. These are decisions that are not made based on assessment basis as stated by the tutors who developed SBME to be used in the time of pandemic:

> *“The tutor arranged a vaginal packing or amniotomy set and send them to students by mail, and the students learned from the video produced by the tutors. The students then practiced and recorded and sent the clip back to the tutors to assess.” (Int Ref PCM1_7)*

> *“The policy is that teachers will simulate the cases for students to study. They prepared and then discussed online video call, it is also an assessment, there were about 2 cases per person in a rotation.” (Int Ref PCM1_5)*

These findings suggest that PCM face-to-face SBME offers viable types of SBME for medical education as assessment tools which deliver particular outcomes’ assessment. However, the ability to engage with face-to-face SBME typically required in-house capabilities (simulation centre resources and teams) and regular substantial sessions for training to maintain tutor SBME accessibility. As tutors stated in interviews where and when SBME is a necessity results in a need of facility investment and financial support from the medical school:

> *“Before, we probably didn't have much trouble with patients about the procedure because we had a resource. We had a lot of opportunities in our hospital, with and without supervisions. There are a lot of patients, but when there's covid, it's clear that medical students can't get on the same experience.” (Int Ref PCM1_6)*

PCM SBME is used mainly by clinical tutors as they have had SBME experiences. When SBME implementation is shaped by a lack of SBME needs, an availability of SBME in pre-clinical years and practice in clinical setting, this explains how SBME is valued in this Thai departmentalized medical school context.

5.3.1.5 Departmental (assessment-based) Patterns of SBME Used

There are a range of SBME activities dispersed in the current PCM UG curriculum which are involved in delivering different outcomes and assessing different levels of outcome complexities. SBME tutors with a departmental and fragmented SBME basically engage in direct or face-to-face SBME. This is due to the departmental proximity with SBME and student. This is in comparison to some of the institutes which have systematic SBME and a centralised unit, but also have the capacities to supply the SBME needs of each individual department, often using either SBME equipment delivered to the department or to manage their own resources.

When asked about how SBME were delivered to students, the information was gathered through multiple data sources. The approach proposed by Shumway & Harden (2003) is not only used as a means to categorise learning outcomes but defines the structures and processes Similarly, direct SBME involved a 'face to face' interaction and exchange between the tutors and students, the responsible departments were involved in the teaching mainly within the department. The lessons and quality of the SBME were communicated to the tutor and student through study and assessment guides.

The Thai medical school created and sustained the existing SBME implementation such as the national license OSCE and the final year combat medicine field exercise because these provided access to the special resources and assets and had the financial capital to be able to invest in the existing assets. The SBME used highlight how different departments utilized a variety of SBME to improve student's competency against their departmental learning outcomes. Although, the range of teaching and assessment were produced for the face-to-face format, in the time of COVID-19, face-to-face SBME and its online component had less support in terms of physical and financial capital. The tutor reported how he had to create online resources during the pandemic:

> *"During the covid, I had to set up the camera myself, talked and recorded by myself and them delivered to my students." (Int Ref PCM1_3)*

Types of SBME are now discussed in more detail, beginning with the early years SBME. Primary data collection indicates that these early years implementation was dispersed and was not in the form of the systemic SBME. As noted previously, tutors typically draw on a departmental outcomes and simple face-to-face procedural-based SBME is the most common form of SBME, as the physical capabilities of each individual department network tend to support these special SBME sessions. From Table 5.3, it can be seen that SBME sessions are not in order and range from simple procedural SBME in relation to basic science to military medicine related field exercise in the final year. However, the sessions were not constructively designed to align with one another or with the exit learning outcomes as the tutors did not communicate either in person or through study guides.

A determinant of the type of SBME that tutors used also depended on the department involved. For early year SBME that required a simple communication and clinical medicine skills, 'links to the clinical skills' seemed not to be necessary and this had the effect of making SBME less important than traditional teaching, especially for non-clinicians. This was captured from both interviews and the study guide used to demonstrate how the SBME was not prioritised:

> *"They (non -clinical tutors) still don't understand what kind of teaching style can be called or named as medical simulation, and they still don't understand what teaching by Sim should be. How can it be combined with their subjects, especially pre-clinical educators." (Int Ref PCM1_1)*

Table 5.3: PCM's Outcome-based Curriculum

Year	Location	Type of training	Resources used to support SBME	Types of SBME
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
3 (Community Medicine)	Classroom/ community	Communication (Community survey interview assessment)	SP and real community villager	Face-to-face (individual and group)
4	Field exercise	Combat casualty care	Simulators and SP	Face-to-face (individual and group)
4 (Community Medicine)	Classroom/ community	Communication (Consent for interview assessment)	SP and real community villager	Face-to-face (individual and group)
4 (Clinic)	Classroom	Procedural (Surgery/OBGYN) Communication (Medicine)	Simulators and SP	Face-to-face (individual and group)
5	Simulation Centre	Acute clinical care management	Simulated ward, SPs and mannikin	Face-to-face (Individual and group)
6 (Mil Med)	Field exercise	Combat casualty care and team management	Simulators and SP	Face-to-face (individual and group)
6 (National license Examination)	Simulation centre	Procedural and Communication skills	Simulated OPD, SPs and mannikin	Face-to-face (individual)

Source: Documentary analysis (Study and assessment guides)

This does mean that departmental SBME can sustain implementation and enable embeddedness of the SBME. An essential aspect in the implementation revolved around satisfying institutional needs about the necessary attributes of outcome assessments. They appeared to disregard the importance of the entire sense making process of the medical school

either through communicating this beneficial SBME information with prospective tutors rather than the enthusiasts who may have basic understanding of SBME and more potential to become SBME tutors, or who can diffuse the SBME teaching methods. One described it thus:

> *"They still don't understand what kind of teaching style can be called or named as medical simulation, and they still don't understand that what teaching by Sim should be. How can it be combined with their subjects, especially pre-clinical educators." (Int Ref PCM1_1)*

In communicating SBME teaching, which is not inherently linked to the curriculum, SBME cannot be differentiated from other PCM pedagogies. This spiral characteristic promoting personal development, as mentioned by Harden et al. (1997), has been only seen in a small part of the Thai medical school, it then did not yet enable a particular learning space to be wholly replaced by a spiral SBME strategy and not valued based on student centred and constructivist approach. PCM SBME provides a practical assessment-based curriculum strategy in delivering learning to students. This notion of assessment-based SBME embeddedness is important for differentiating a new assessment space rather than a learning space, a feature that was captured and confirmed by tutors when discussing the types of 'outcome assessment' that they want to have as staff members:

> *"It's mostly about how we simulate it using a surgical device and a simulator. In the pre-COVID period, TMC was only primarily concerned about the procedures required for our 6th year to be competent in before graduating. The surgical department is responsible for assessing 5 procedures, which is the basis that needs to be achieved at the end." (Int Ref PCM1_5)*

Tutors also emphasise the importance of local needs and resource availability having an effect on accessibility to the engineered learning environment. PCM medical education is linked inherently to the social conditions, including the cultural (medical practice) context, in which they are situated. This explains why PCM SBME is not used to entirely adopt a spiral SBME strategy. As tutors elaborate, the fragmented nature of the PCM and SBME structure, which can

also be linked to the implementation and innovation, is the key area for not moving to SBME pedagogy. This inhibits the opportunities to communicate strong SBME and place linkages that, as noted by tutors, are an important part of medical knowledge transfer and knowledge integration. One interviewee states:

> *"Honestly, there has been no platform for us to discuss this because usually when writing a course, each block's people actually go to write their stuff, we don't have time to sit down and talk about it, but there's still a long way to go." (Int Ref PCM1_1)*

This tutor recognizes that communicating SBME and notions of simulated spaces to tutors allows them to differentiate SBME from traditional real patient encountering teaching methods which can make such claims, especially traditional UG curriculum which is currently used in PCM. PCM tutors did not fully value SBME and the SBME sessions embedded. This issue appears to have an effect on recruitment and retention of the SBME tutors involved.

5.3.1.6 PCM SBME Tutors' Recruitment

Face-to-face SBME are evident in the Thai medical school. These sessions are made possible through individual departments and their collaborative tutor networks within both the medical school and the hospital. A focus on departmental networks was undertaken in order to understand how and why SBME tutors capitalize on and engage with face-to-face SBME as part of undergraduate assessment-based curriculum strategies.

The understanding of the networks that exist amongst staff that relate to particular departments throughout the medical school and hospitals exposed an important finding from this Thai research. It is clear that medical education is dependent upon medical school and hospital staff co-operating with one another. SBME tutors are more likely to be clinicians, undertaking activities that might be encapsulated in the term 'assessment based SBME'. This link between tutor and specific SBME activity can allow tutors to have a particular network but a limited range of assessment-based SBME strategies, such as the SBME network that confines them to a particular group of tutors:

Only one group of tutors that fully implements SBME is Dr XXX and his ER colleagues. (Int Ref PCM1_2)

PCM tutors have few educator training sessions and there is limited opportunity to develop an understanding of SBME beyond the tutors' teaching knowledge. This is captured by tutors, who also allude to going beyond traditional teaching to promote integration in order for their SBME to be viable. Similarly, a tutor is often convinced into going beyond the traditional level to offer a wider range of SBME. It is evident that departmentalization, pre-clinical and clinical separation, is a barrier in terms of integrating medical education for their SBME:

"Clinical educators don't have much trouble. The problem is at pre-clinical side because they haven't seen and used SBME in teaching." (Int Ref PCM1_1)

The reason existing SBME tutors prefer to support SBME cannot be reduced to assessment or teaching ability. Rather, it is influenced by a desire to support SBME in satisfying the requirement of the institution, both to develop physicianship and officership. Tutors agree to the aims to support face-to-face SBME as part of departmental assessment-based curriculum strategies. This nevertheless supports the work of Issenberg et al. (2003) who argue that implementors engaged in SBME implementation often draw upon 'traditional' curriculum networks. As such, it is surprising that there is a hybridity of both traditional and integrated curriculum delivering alongside more traditional curriculum, but there exists an underlying preference for medical school departmentalization. The current model does not go beyond departmental necessity and capacity to develop and sustain an SBME relationship with other related SBME tutors. This reliance is a choice and reflects the sense of departmentalisation.

The existence of departmental SBME relationships amongst SBME tutors can be understood as primarily about educationally driven (assessment-based) strategies. However, this departmental SBME can be regarded as an outcome-based curriculum strategy born out of some degree of outcome assessment as well as safeguarding the institutional identity. The preference to collaborate with other SBME tutors also means that there exists a range of outcome-based curriculum strategies and medical education structure for face-to-face SBME,

providing both assessment-based, and a variety of SBME for different departments and student identity development in some departments in the undergraduate curriculum.

Developing networks locally are based upon practicality, more so than a 'regard' for other SBME tutors. The degree to which tutors collaborate and develop networks with others depends on their underlying motivations, medical educational goals and institutional expectations. This is now discussed, considering how tutors engagement in a range of SBME determines their assessment-based curriculum strategies and how they make use of the resources and networks available.

Clinicians and non-clinicians deliver objectified forms of undergraduate medicine outcomes. This is significant in terms of medicine because undergraduate and military medicine is an important verifiable product that can be experienced as a representation of particular practice, place or identity. Practical teaching presents an opportunity for students to embody medicine and the military medicine culture, if only through acts of practicing, reflecting, and receiving feedback. PCM SBME tutors did not appear to take seriously this unique role in communicating particular clinical learning associated with a particular community of practice. Only some SBME tutors are able to communicate these notions of mission-based and identity formation through SBME with value laden information. The tutor commented on the tutors and their understanding of SBME value in teaching:

> *"At first, every tutor must think SBME is necessary. Personally, using SBME is better than nothing. Using improper simulators or simulations also closed to doing nothing, for example, practicing Leopold manoeuvres with pillow or assisting normal delivery with a doll are not equal to doing it on a proper manikin that has a pregnant figure. From this, if every tutor understand that SBME is important, he can tell why we should have sim." (Int Ref PCM1_3)*

Technical (medical procedures) and non-technical (leadership and management) skills development are highly dependent on learning outcomes and are an asset that tutors engaged in clinical teaching may be able to capitalise on. Cultural capital may not be easily utilized or

communicated where there is less concern and association between contextual factors. Such linkages are needed for specific concepts or outcome-based education to be constructed as a means of differentiation of SBME implemented. This may account for specific departmental SBME and SBME tutors from PCM where linkages between special learning outcomes, learning process (SBME), and the learning environment (battlefield like environment) are muddled and established, such as in the military medicine simulated operation that has to be implemented in the time of pandemic as commented on by one interviewee:

> *"This is because we want our final year field exercise to be done onsite. The joint operation was cancelled. This year is to be decided." (Int Ref PCM1_2)*

Cultural capital (medical practice both informal and hidden curriculum) and identity formation (military medicine) in the context of PCM can therefore be understood as the usable learning material or utility of the connections between identity to be formed, epistemology and practices such as social or medical education embeddedness. These connections are arguably what comprise the linkages between outcomes, SBME process and the simulated environment and are what enable the all-important process of quality construction to take place within PCM SBME. These cultural and medical practice capital ultimately allows tutors in pre COVID-19 contexts to differentiate SBME through face-to-face SBME, allowing a degree of reconnection with the current specific practices. As one of the tutors describes the adaptation occurring during the pandemic:

> *"We created a health promoting hospital where there's a community transmission occurred around the hospital. There's a case to come to hospital. However, when it's not a real building, things are not like real situations. Setting up a war room and setting up an EOC in a simulated setting are not going to be like much, and then scenarios turn out to be difficult for kids. Because of that, the kid can't figure it out. (Int Ref PCM1_4)*

5.3.1.7 Understating of Pre COVID-19 SBME

The preceding discussion about medical practice was centred primarily on face-to-face SBME. For SBME, where interaction occurs on a 'face-to-face' basis between tutors and students, constructing quality around institutional learning outcomes, National Licensing Examination and military identity formation. There are linkages with social conditions (healthcare service and medical education needs) that facilitate the delivery of PCM SBME.

The pre-COVID-19 SBME in PCM is highly dependent on the type of interaction and relationship that exists between learning outcomes and the assessments to be measured. Educational pedagogies based around SBME were adopted partially. This is because PCM SBME implemented is generally communicated through the educational relationships among curriculum, assessment process and learners as opposed to solely through other outcomes cues explicit within assessment materials. This is noticeable within assessment tools as they communicate directly from the medical school to either tutors or students. Here, the quality of the SBME requires further guarantee given the close relationships that exist between learning outcomes and assessments.

Notions of departmental learning outcomes are implied and explicitly demonstrated. In addition, communication through assessment guides to tutors fosters a greater sense of cognitive participation and collective action towards the outcomes (OSCEs) to be assessed. This is captured by tutors, who cite direct relationships between end outcomes and the SBME designed:

> *"TMC was only primarily concerned about the procedures required for our 6th year to be competent in before graduating. The surgical department is responsible for evaluating 5 procedures, which is the basis that needs to be achieved at the end." (Int Ref PCM1_5)*

Face-to-face components are also more manageable than online components when certain types of SBME are involved. This is most notable with online or distance components, of which most interviewees were not involved with (see Figure 5.7). This is worth exploring because

online and distance SBME versions, in terms of the communicative and educative focus of the curriculum in the time of COVID-19 pandemic, later emerged, and so more detailed comparisons can be drawn.

Face-to-face SBME is therefore arguably more suitable at PCM when assessment is involved and where experienced clinician tutors have the capability and capacity to use them. The use of PCM SBME occurs at the point of assessment rather than with teaching related session. This is a reason why tutors continue to operate successful assessment-based SBME in this medical school setting where resources and support are available for the assessment required.

These forms of SBME enable face-to-face clinical tutors to retain control of assessment and teaching, but at the expense of scattered distribution of SBME in the curriculum. This is clearly a trade-off that PCM tutors face when determining their outcome-based and assessment-based SBME implementation strategies, particularly those of non-clinicians participating in integrated teaching and who are not involved in clinical medicine, leading to feelings of uncertainty about 'what to teach' and 'when to teach'. Unstipulated changes of teaching roles were described in interviews as unable to enable and moralise for tutors as it meant resources and supports also changes upon ordered.

> *"They still don't understand what kind of teaching style can be called or named as medical simulation, and they still don't understand that what teaching by Sim should be. How can it be combined with their subjects, especially pre-clinical educators." (Int Ref PCM1_1)*

While non-clinicians did not understand and value SBME for teaching, clinician tutors collectively prioritise real setting teaching over an adaptation of SBME to suit learners' needs. Some procedural skills requirement and reduction of real patient encounters were acknowledge as being specific to the needs of the simulated learning environment, something that 'everybody has to experience', hence normalising can be seen from these SBME practices:

> *"Before, we probably didn't have much trouble with patients about the procedure because we had a resource. We had a lot of opportunities in our*

hospital, with and without supervision. There are a lot of patients, but when there's covid, it's clear that medical students can't get on the same experience." (Int Ref PCM1_6)

In summary, the PCM setting curriculum needs was led by assessment rather than SBME as a teaching tool. The need to deliver learning was found to lead to tutors reproducing or simulating specific sessions with reflection on effective summative assessment of practice. However, more collective efforts towards compliance were articulated to be assessed in real clinical settings rather than in SBME sessions. Although the same standards or structures of clinical skills are considered as promoting good practice and needs at the exit point from the academic programme, difference in learning outcomes meant that clinical practices were selected and prioritised. It was observed that clinical teaching and time were used to justify applying SBME more during the pandemic as a result of reduction of patient access opportunities.

5.3.2 H2: COVID-19 SBME and Realisation of SBME Needs

SBME tutors experienced impacts of the pandemic and changes in the scope of their practice (Table 5.4). Four over-arching themes were identified, along with definitions and sub-themes (Table 5.5). SBME re-emerged as a replacement for clinical teaching during the pandemic and illustrated that distance education, online learning and other blended strategies can be fundamental to managing education, teaching, learning and assessment, across disciplines and the learning continuum during adversity. They are expanded below, with selected quotes highlighting the content of each theme.

The pandemic created a new emerging problem to Thai healthcare services and medical education, particularly in clinical settings. Social distancing and interaction restrictions occurred in clinical settings resulting in a shortage of patients and time constraints to practice in the clinical environment. These changes led to deficiencies in clinical skills development that used to be acquired through practicing in clinical settings. Blended SBME became one of the clinical teaching practices of choice during the pandemic. At PCM, the emergence of blended SBME was found in many departments (Table 5.4).

Table 5.4: PCM's Pre- and Post-COVID-19 SBME

Year	Location	Pre-COVID-19		COVID-19	
		Resources used to support SBME	Types of SBME	Resources used to support SBME	Types of SBME
1	-	-	-	-	-
2	-	-	-	-	-
3	-	-	-	-	-
3 (Com Med)	Classroom/ community	SP as community villager	Face-to-face (Individual and group)	SP as community villager	Online
4 (Mil Med)	Field exercise	Simulators and SP	Face-to-face (Combat casualty care)	Simulators and SP	Postpone
4 (Com Med)	Classroom/ community	SP as community villager	Face-to-face (individual)	SP as community villager	Online
4 (Clinic)	Classroom	Simulators and SP	Face-to-face (individual and group)	Simulators and SP	Blended and prioritised face-to-face SBME
5 (Acute care)	Simulation Centre	Simulated ward, SPs and mannequin	Face-to-face (Individual and group)	Simulated ward, SPs and mannikin	Blended and prioritised face-to-face SBME
6 (Mil Med)	Field exercise	Simulators and SP	Face-to-face (Combat casualty care)	Simulators and SP	Blended and prioritised face-to-face SBME (Delayed)
6 (Exam)	Simulation centre	Simulated ward, SPs and mannequin	Face-to-face (National Licensing Examination)	Simulated ward, SPs and mannequkin	Face-to-face (National Licensing Examination)

Source: Documentary analysis (Study and assessment guides)

COTMES recommendations aimed for medical schools to rearrange and introduce their approaches to deliver clinical education to medical students at minimum risk to the students. The recommendations focus more on adaptations of education and training provided for clinical year students. The consortium generated a broad approach referred to as 'depending

on the situation' allowing the medical schools to ensure that the students' learning was thoughtfully considered to ensure their learning outcomes were met. The COTMES meeting on March 2020, reporting mainly on clinical year training and placements, advised:

> *'...send medical students out for training in affiliated hospitals, in case that the main teaching hospital cannot offer. We ask you to postpone those placements until May 2020 while Thailand's state of emergency remain in effect. Please reconsider the necessity and priority." (COTMES, 2020)*

A pedagogical shift occurred and blended SBME emerged during the pandemic but appeared to be temporary depending on the impact of the pandemic. One of the TMC activities was postponed and eventually innovated since early 2020 was the national license OSCE. In October 2021, as the pandemic situation remained unchanged, TMC allowed individual medical schools to assess and certify its students' competency by covering seven aspects required by the TMC which were considered equivalent to the national license OSCE. The TMC announced that:

> *"For the domestic medical schools, each institute has to assess and certify its own students which could be from personal log books, examinations or other assessments available. This is to cover seven aspects and comply with the national license OSCE. Please send the results to the Center for Medical Competency Assessment and Accreditation (CMCAA) in the form provided." (COTMES, 2021)*

SBME was not prioritised but mentioned in the (April 2021) COTMES monthly meeting as a national survey of SBME granted by COTMES was reported. The study found that SBME has been used for teaching and assessment, but a lack of investment had limited SBME development and there was a need to embed SBME into the curriculum, develop SBME teaching, establish a simulation centre and support system, and find solutions for SBME management. COVID-19 and its effect on SBME were not considered at this point (COTMES, 2021).

While the focus of TMC and COTMES were specifically on the SBME and its disruptive innovation, the evidence demonstrated that SBME and blended SBME were used during the pandemic (see Table 5.5). Unlike pre-COVID-19 UG medicine, the pandemic has illustrated that SBME, distance education, online learning and other blended are fundamental to managing medical education across disciplines and learning continuum. To mitigate strained healthcare and medical education resources, UG tutors experienced impacts of the pandemic, especially on the number of patients encountered, and scopes of their teaching practice changed. Four over-arching themes were identified, along with definitions and sub-themes (see Table 5.5). The sub-sections that follow the table are expanded below, with selected quotes highlighting the content of each theme.

Table 5.5: Themes and Sub-themes Identified for COVID-19 SBME and Broad Definitions

Theme	Sub-theme	Explanation
The emergence (recognition) of healthcare and medical education problems	Acknowledges importance of social interactions	This theme highlights tutors' emerging awareness of the importance of social interaction for their own teaching and students' learning
	Acknowledges importance of patient encounter	
Impact on UG teaching	Prioritising SBME over clinical teaching	This theme highlights the extent to which tutors have begun to acknowledge SBME and blended SBME, or have a plan to do so due to the pandemic
	Acknowledge importance of SBME and distanced/blended SBME	
Impact on quality and the wider medical school determinants	Initiating distancing and online SBME	This theme revolves around the idea that COVID social distancing has influenced quality of blended learning and the roles that tutors plays in addressing these qualities.
	Redesigning and facilitating sessions	
Impact on learning environment	Limited time and number of contacts	This theme reflects tutors' increased awareness of the importance of health and safety issues. This theme relates to tutor-learner-patient health and well-being.
	Distance learning required	

5.3.2.1 Acknowledging the Emergence of Healthcare and Medical Education Problems (Shortage of Social Interactions)

The interviews capture the sense that the emergence of COVID-19 pandemic and its social distancing preventive measures had made tutors realise an effect on healthcare impacted on medical education and led to changes to the curriculum strategies.

The distancing property of the online component emerged is a determinant of the type of blended SBME that can be used. Unlike face-to-face SBME, the online component has a far shorter 'interaction' and is more vulnerable to relationship, meaning that the more extended the distance learning component becomes, the smaller the window for face-to-face SBME and physical interaction. However, pre-COVID online SBME components existed and were used to increase accessibility to some of the materials, study guides, used for SBME.

The pandemic has demonstrated that distance education offers some resilience in managing education across disciplines in enabling learning whilst retaining social distance. The tutor experienced online teaching commented on how to enable learning during the pandemic:

> *"When the covid pandemic we couldn't get the kids to teach physical examination, all we could do was we gave the kids a series of videos, and then we let them learn, and then they showed us how to examine them, and this subject would be the people at home, parents, brothers and sisters. So this is another one that they can do. It's like parents are their backing up." (Int Ref PCM1_6)*

As a result of combining distance learning components, tutor roles and scope of practice were considerably changed to lessen strained medical education resources. The existing undergraduate medicine program including SBME was extended, and curriculum shifts increased students' clinical experiences opportunities by using SBME and blended SBME. One interviewee reported on the situation in Thailand State's Emergency announcing that:

> *"The no more than 5 people rule made us rethink because it was not worth it to arrange the course, so we postponed it until the management said that*

students must study. Students had to study because they have to be ready for their placements, so we thought about what to do. As the year 6 have to do ACLS (Advanced Cardiac Life Support), these groups who are going to the placements have not yet studied ACLS. So we used the same study guides. However, it was a two-day on-site course, first will be a lecture and then switch to practice in the day after." (Int Ref PCM1_1)

The recognition of problems in relation to the impact of the pandemic on medical education breaks down into two sub-themes as a result of very tight social distancing measures from the Government. This led tutors to realise the challenge of the lack of social interactions and of patient encounter aspects of clinical teaching. Creative blended SBME learning, including the use of simulators at the facility and the delivery of the simulators, was re-introduced to bridge clinical related opportunities across the undergraduate education to align with social distancing efforts.

The emergence of SBME reappeared in the stretched PCM curriculum to expand the restricted learning opportunities. Many medical schools adopted and developed some forms of blended learning and expanded distance learning in their undergraduate medicine programs (COTMES, 2020). In this section, the PCM departmental development included more content using SBME in teaching, coordination, and transition management from traditional to distance education, and both departmentalised online material and SBME experience reinforced the uniqueness of the departmentalised SBME curriculum in the medical school undergraduate programme. One representative from the medicine department reported:

"During the covid pandemic we couldn't get the kids to teach physical examination, all we could do was we give the kids a series of videos, and then we let them learn, and then they showed us how to examine them, and this subject would be the people in their house, parents, brothers and sisters. So this is another one that they can do. It's like parents are their back up." (Int Ref PCM1_6)

Such statements suggest, as a result of the pandemic, where practicing in real settings was limited, tutors recognized the changing contextual value of distance learning and SBME. The impacts on SBME re-emergence are now discussed.

5.3.2.2 Impact on PCM UG Medicine SBME

This theme highlights the extent to which some tutors have begun to initiate their new (distanced) SBME teaching sessions, or have a concrete plan to change, because of the social distancing. It reflects changes in UG pedagogy that aligns with the distanced SBME they had delivered.

The PCM SBME programme is among the programmes that had not received permission from the Thai government to support onsite face-to-face redesign in the time of pandemic. Their SBME and social interactions, such as the field operation, had been restricted and postponed until the situation eased. However, the COVID-19 social distancing policy encouraged further enhancement of their departmentalised SBME in finding solutions to include special setting SBME and assessment.

At the beginning of the pandemic, PCM had either postponed or implemented a modified social-distancing approach aimed 'to provide adequate clinical years' students experiences (COTMES, 2020). As the students were unable to experience practice in the main teaching and affiliated hospitals, SBME became one of many solutions. The interviews and documents were analysed and several distance SBME models emerged demonstrating that SBME were used:

> *"At the beginning, they had to study from home. We had to deliver them materials from the hospital. Imagine that we had to send to 24 students. It was the first time that we had to use disposable speculum and a paper cup as a fake cervix." (Int Ref PCM1_3)*

Tutors mostly reported SBME activities as innovative medical education teaching. SBME was among one of teaching activities allowed to be taught in a face-to-face format, and OSCE used as the learning outcome assessment were maintained but modified to suit the disrupted context. The PCM tutors were also thoughtful and innovative. While tutors seemed to be

actively participating in developing the modifications which led to the use of SBME to replace clinical teaching in the time of disruption when students faced significant reduction of real patient subjects, support from the management did not seem to remain with the individual department. A tutor experienced a reduction of patients attended and admitted and an emergence of the SBME needs:

> *"They were very keen to do history taking but the number of patients has been markedly reduced till we had nothing to support them. This's why SBME emerged." (Int Ref PCM1_3)*

However, this began with an awareness of the shortage of clinical exposure situations and taking precautions in addressing the safety and inclusion challenges for both students and tutors. This made the tutors realise the importance of SBME as it reduced the clinical exposure problems, in a blended and distance education format. With their academic partners tutors were participating in designing new, creative educational approaches. This included a more collaborative, SBME experience and expansion of other SBME-enhanced learning. These included developing the pool of simulated patients:

> *"We didn't have many at the time, there were about 10 simulated patients circulating, one set used about 10 of them and kept changing the scenario. Here, when there's COVID, we need more patients because 10 SPs aren't enough because these kids need to report one case a week, or interview and examine a few patients." (Int Ref PCM1_6)*

As a result of being a re-emerging SBME, a lack of understanding and an inexperience of using SBME led to concerns over the delivery of SBME. The following section describes the theme emerging in relation to quality of the SBME.

5.3.2.3 Quality of Re-emerging Innovative SBME in Wider PCM Medical Education Teaching

This is a broader theme and touches on individual department management and support of re-emerging SBME. There was an increase in SBME used in teaching components replacing clinical year UG teaching sessions. It relates to tutors teaching and appraisal of the quality of SBME

delivered. Although underpinning this is the relationship between learning outcome (Task), teaching process (Person) and Learning environment (Context), the fidelity of the SBME seems to be overlooked but later recognized.

In response to pandemic-restricted clinical opportunities, tutors were required to re-think learning and assessment strategies in order to identify different and innovative clinical experiences for medical students. An example of COVID-19 disruptive innovation in the time of huge reduction in real patient encounters was the delivery /pick-up of online SBME. In addition to public safety concepts, addressing social distancing and incorporating student and patient safety were fundamental to SBME re-emerging. A tutor mentioned the modification made to support students during the pandemic:

> *"So Day 1 was semi online and the Day 2 was on site teaching. For on site, we use the fixed station method for a group of students with one tutor. At each station had one teacher and no more than 5 students. Each station apart from each other, so they did not see other tutors or friends, and then one teacher teaches every subject." (Int Ref PCM1_1)*

The socially distanced medical education programmes including SBME were created by the individual department members, particularly those in later year clinical departments. The programmes occurred within each department, starting with receiving social distancing orders from the management and continuing with brainstorming, modifying pre-COVID-19 teaching and combining with new emerging SBME curricular, and re-scheduling of medical students. This was later followed by mentoring and monitoring through the available means either distance or online learning platforms. Similarly, the emergence of a re-translated SBME programme focused on maintaining teaching and assessment to deliver the outcomes set. The study guide (lesson plan) outlined potential online SBME learning over the clinical year programme and identified benefits of this emerging pedagogy. The communication for this unique distance programme seemed to pave the way for other curriculum designs that addressed not only the educational gap, but also student and patient safety and other forthcoming medical education challenges.

5.3.2.4 Forced Safety Learning Environment

Finally, educators recognised the necessity to redesign clinical education and medical education preparation that allow exposure to 'clinical safety experience,' reshaped clinical teaching from merely face-to-face patient-based teaching to a blended SBME learning approach and demonstrated the SBME role in being an asset to counter weaknesses in the disrupted medical education system. This was accomplished through communication utilising both existing and emerging media and steering mechanism across the medical schools, and by supporting and participating in a growing SBME implementation. A tutor explained how he utilised available resources to accommodate his blended SBME delivered:

> *"The sessions were adjusted to one day for lecture and one day for practice. The day of the lecture, we did it all online, it was not exactly a lecture, it was all online video, there was the same problem that when we used Zoom to teach this, the video was jerking. I splited into 2 rooms for the students to sit apart, the lectures were taught all online. But on zoom, the video was unstable. We divided into classes, for example, 25 people divide it into 12 and 13." (Int Ref PCM1_1)*

For PCM, SBME has not been key to medical education and preparation of medical students and communities. A new generation of medical students is now needed, one that recognises the importance of limited patient exposure and the safety clinical experience. They should be able to use and build on the increasing evidence base supporting the link between technology-enhanced distance learning and a shortage problem in medical education. Through the disrupted innovation created by COVID-19 pandemic, it seems that the medical schools should return to fundamental tenets of face-to-face interaction, justification of distance clinical learning and clinical safety experience for all. It has also provided the opportunity for SBME elite and experts to model deliberate practice curriculum and lead transformative innovation of medical education and redesign future UG medicine preparation of our medical graduates. The elite mentioned the readiness of the simulation centre together with the increase SBME value should promote the SBME implementation. He said:

"I still believe that if everything comes back, the building will be used. Now we encourage everyone to use it, but it has to be infrastructure, there must be a scenario, and then each group can develop from here. There may be a lag period before we get an example of SBME use." (PCM1_15)

Similarly, within this theme responses highlight the recognition that certain risk factors for COVID-19 transmission are preventable. According to the very tight preventive measures, these responses suggest a shift in teaching, which the importance of SBME benefits the students in their day-to-day learning and offer benefits for medical education in teaching practice. This shift from traditional patient encounter to alternative SBME is central to the delivery of clinical teaching during the pandemic.

5.3.3 H3: Transformative View of SBME

The Transformative Innovation framework used in analysing the PCM context demonstrates systemic changes. The H2 patterns found in this study represent a number of departmental practices created by those who are responsible for UG teaching in the time of COVID-19 disruption. The third horizon or H3 offers the voice of the visionary. In the data, patterns of activities with more 'fixed and negative' mindsets are reported from the interviews.

5.3.3.1 SBME Was a Temporary Movement

Dispersed and selective blended SBME has been adopted in the time of the COVID-19 pandemic, including the emergence of new models of distance learning SBME. The pandemic was observed as a stimulator for re-emerging SBME implementations. However, these initiatives were seen as the disruptive innovation of UG medical education. One PCM tutor commented on Entrustable Professional Activities (EPA) assessment and the possibility to use SBME instead of assessing at the practice settings:

"After COVID, the 4th year student is starting to use this EPA. The obstetric department is responsible for the vaginal packing, amniotomy, pelvic examination and normal labour. These skills need to be demonstrated at the

OPD or at the delivery room, and then let the teacher see or maybe practice with a mannequin or something like this." (Int Ref PCM1_7)

PCM interviewees' preference appeared to be unchanged and continued the pre-COVID-19 business as usual to maintain the existing undergraduate medical teaching, anticipating that the situation would get back to the norms of the pre-COVID-19 period. Problems identified and solutions used in building knowledge of blended SBME learning and exploring possible routes to deliver blended SBME during the pandemic were not clearly envisioned to be further implemented. The tutor mentioned without ensuring that SBME innovation will last as the development of SBME depends more on resources which did not reflect the needs of SBME:

"The sims will be seen more also in a new curriculum, it's a policy to push sims in more because we're getting more resources, I think the part that we probably haven't yet talked about sim based a lot is because we didn't have resources" (Int Ref PCM1_6)

5.3.3.2 Sense of Impracticality as a Competitor for Resources

There were creative processes in developing new SBME approaches challenged by the social distancing measures. Interviewees reported how PCM undergraduate medicine tutors brought in SBME and blended SBME as an inspirational 'disruptive innovation' supporting the sense for a needed shift of teaching direction. Creative approaches were found as alternative methods and strategies for temporary undergraduate medicine teaching. Tutors commented on an impractical innovation that occurred:

"At the beginning, they had to study from home. We had to deliver them materials from the hospital. Imagine that we had to send to 24 students. It was the first time that we had to use disposable speculum and a paper cup as a fake cervix." (Int Ref PCM1_3)

A shared perception of future impracticality can be seen in this study. PCM tutors appeared to hold fixed mindsets of pedagogical practices associated with real patient encounters which influenced the success of future SBME implementation and innovation. Lack of understanding

and co-construction of this SBME vision in PCM seemed to endanger the development of SBME. A PCM elite reported:

> *"…try to encourage tutors to use sim based learning training in both on- and off-site locations. Actually, before COVID, it was going well. This is aimed at getting teachers to develop scenarios that will be used to make sim-based learning, and actually we wanted all subjects (if possible). When we go through the departmental evaluations, we try to get a lot of potential departments to use it, but when there's Covid, everything is stopped, it's all online. Even the OSCE exam is online." (Int Ref PCM1_15)*

5.3.3.3 Deeper Issues of SBME as a Competitor

As the H3 vision involves normally looking for 'transformative innovation' this might have involved seeking to develop the shift from face-to-face SBME value in the direction of more blended SBME approach. Although the pandemic led to both a rise of re-evaluation of the existing teaching approaches and an increase of new models which disseminate shared essential distanced SBME components and the use of online tools to support this, PCM envisaged SBME as a competitor to practice in clinical settings.

> *"It's difficult to make it near to a real patient encounter. Leopold maneuvers are not that easy without real patients as hi-fidelity manikin cannot be delivered to students' home." (Int Ref PCM1_3)*

The pandemic showed that, when necessary, the resources can be assembled and a new SBME and a blended SBME for the wider undergraduate medicine can develop. Without a distributed leadership model in place to act and lead the transformative innovation, the essential face-to-face SBME and supporting online component were not developed fundamentally. SBME remained unsuccessfully and unsystematically mobilised. Tutors, time, available space and resources have not been arranged to support changes as a result of medical school leaders not demonstrating the value of SBME.

The discussion now focuses on the relationship that exists amongst SBME NPT related factors throughout the implementation, as the collaboration and networks of SBME tutors form with one another have emerged.

5.4 NPT Implication in SBME Implementation

Departmentally, it is possible to see that each session provided relevant information for the session or system to be undertaken, this includes formative and summative assessments. This is because the models which were deployed used the department outcomes, course coordinator and the team identified for each session. In addition, pre COVID-19 SBME did allow the use of outcome-based education as a way to identify individual department outcomes to be met and assessed. This led the student to navigate the department learning outcomes and perform the appropriate medicine integration activity. Overall, this SBME implementation case study has illustrated that the SBME structure is suitable for executing outcome and assessment-based medical education.

The following sections examine the understanding of SBME implementation, and the logic framework used in the stages of Transformative Innovation (TI). The aims of using the Transformative Innovation Framework is to provide an understanding of dominant SBME and the innovative change from pre-COVID-19 and into the pandemic. Again, it is important to investigate whether micro and macro environments have provided the required resources and functions to execute the disruptive SBME implementation process.

In this case study, the SBME sessions have occurred in a department-organised way, where each session may not effectively inform the following session. Each session may or may not provide the relevant information for the following session or system to be executed. This includes teaching activities and assessments. This is because the models which were departmentally deployed used the outcome-based curriculum with a course co-ordinator and the team identified for each session. In addition, pre COVID-19 SBME allowed the use of outcome-based education which focused on identifying the desired end outcomes or objectives to be achieved, rather than emphasizing the progression of each individual step. However, these have led students to identify the exit learning outcomes and perform specific military and

medicine integration activities. Overall, the SBME implementation case study has illustrated that the existent SBME structure was suitable for executing an outcome- and assessment-based medical education.

As mentioned previously, the TI framework is used to frame and facilitate the understanding of change in organisations. As this component of the study was performed after the pandemic, a recall at this stage would represent the dominant SBME implementation, disruptive and, perhaps, transformative innovation occurring in response to the disruption. Our findings describe data from interviews and documents used in the implementation. Overall the data demonstrated that some of the interviewees regarded UG SBME as legitimate innovation in their activities (cognitive participation) and SBME later became additional interactionally workable activities (collection action) for them, especially their roles in replacing practice in clinical settings during the pandemic. Therefore, they did implement departmental SBME; additionally, they constructed a set of meanings for their SBME implementation, that gave this SBME teaching practice significance.

The results of the analysis revealed interconnected themes in relation to the SBME implementation which resonated with the NPT constructs (see Figure 5.7):

- Coherence: Dissonance between SBME curriculum and practical reality
- Collective action: UG implementation of assessment-based SBME
- Cognitive participation: Challenges to legitimise the SBME in practice
- Reflexive monitoring: Divided reflection on SBME practices.

Two additional themes were identified as they described the determinants for actual implementation of SBME:

- Workforce collaboration: Identity formation pressure and prioritisation of SBME in medical education.
- Theoretical frameworks: Outcome-and assessment-based education

Figure 5.8 demonstrates how NPT constructs underpin the analysis for PCM logic model. The themes interact dynamically and non-linearly to provide an explanation of SBME

implementation. Similarly, coherence and cognitive participation influenced (and were influenced by) collective action. The assessment required to be demonstrated enables SBME teaching and the use of OSCE for assessment, especially in military medicine. There is a partial sense of unity between the curriculum and teaching practice alongside local challenges and enablers to legitimate SBME related practice, mainly national licensing examination, military medicine and the simulation centre. Implementation seemed to be operationalised by adherence to assessment and identity construction rather than through reproducing spiral SBME as in the UoD. Divided reflection on SBME practice, workforce understanding, and identity formation pressure further triggered the departmental implementation of the SBME. This highlights opportunistic aspects that could promote de-departmentalisation and SBME implementation including facilitating roles such as interventions to promote alignment of curriculum with SBME training, learning outcomes and local practice.

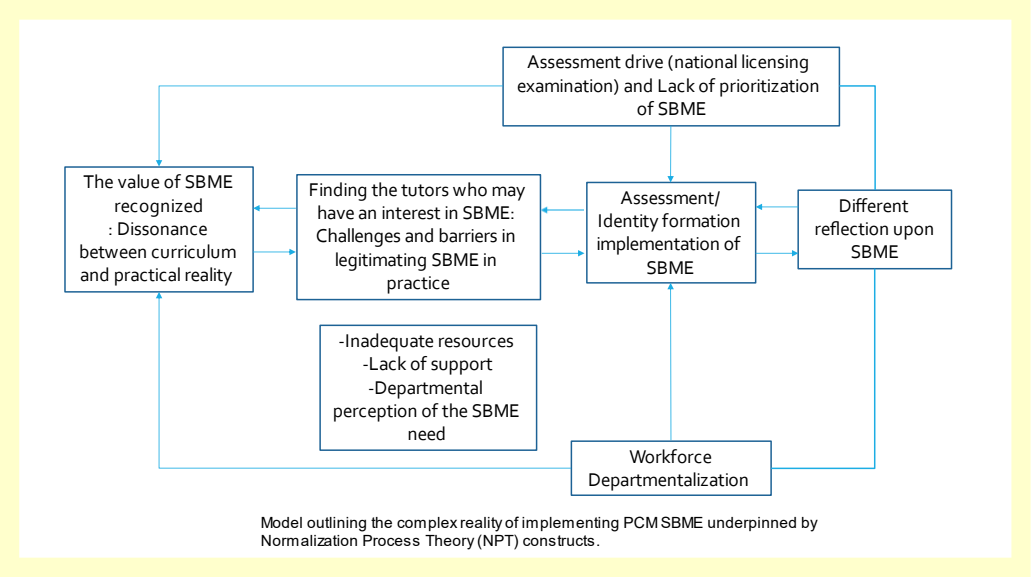


Figure 5.8: Model Outlining the Complex Reality of Implementing SBME Underpinned by NPT.

Researching through a pandemic demonstrated that PCM tutors used more SBME as it created learning opportunities (Figure 5.9). The re-emergence of SBME reflected the reduction of an opportunity to learn from real clinical settings led to an increased value of SBME. The pandemic led PCM tutors to realise that SBME and blended SBME, when prioritised, could be used and be added or embedded in UG medical education.

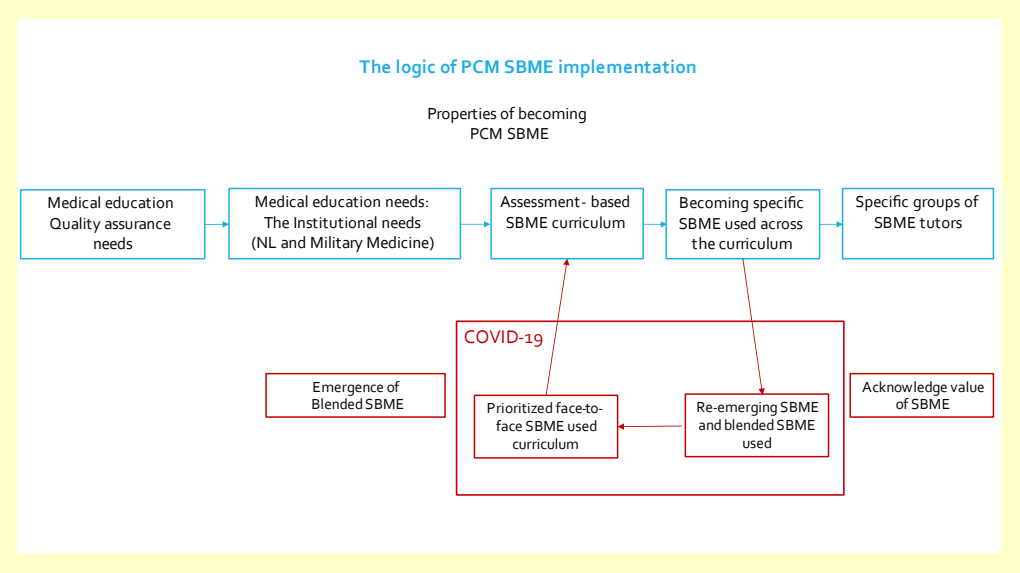


Figure 5.9: The SBME Implementation Logic Framework

The aim is to provide a step-by-step illustration of the NPT framework applied to the data collected. The following section is organised into four sections to explore PCM NPT comparative propositions and extra themes that match with the previous case.

5.4.1 Coherence: Dissonance between SBME and the Local Curriculum

Based on the process objectives, this stage involved identifying four main aspects for the NPT constructs: 1) the perceptions of SBME, 2) the understanding of SBME in UG medicine, 3) the agreement about SBME, and 4) the benefits and value of SBME. The following explains the construction of the SBME sense making process at PCM.

As mentioned in the previous chapter, "perceptions of SBME" provide a basis for understanding the importance of SBME. The three main activities identified for tutors to follow include *consideration of key medical education problem(s), identifying solution(s),* and *identifying medical education user(s).* In this case, the latter activity was highly necessary because SBME was not adequately provided by PCM. The other two activities have not been identified until recently after the COVID-19 pandemic which reflected the key medical education problem(s) that required tutors to consider teaching alternatives. In this case, pre-COVID 19 SBME was initiated by the medical education (military medicine) system problems as an internal entity.

The second activity recommended a set of possible solutions that could assist tutors to investigate their perception of SBME which was obviously seen after the lack of patient exposure occurred. These solutions were selected because the study proposition falls into the "SBME" and "identity formation" categories as expected, a list of importance for SBME.

Prior to the pandemic, the process through which participants shared and created an understanding of the SBME framework varied across PCM. Overall, participants expressed a conflict between SBME and the practical realities of teaching in the existing curriculum. Within our data, participants working on a traditional curriculum expressed their opinion (in interviews) that PCM was change avoiding and SBME recommendations could therefore be overlooked in this setting:

> *"Before, we probably didn't have much trouble with patients about the procedure because we had a resource. We had a lot of opportunities in our hospital, with and without supervision. There are a lot of patients, but when there's Covid, it's clear that medical students can't get the same experience." (Int Ref PCM1_6)*

In pre-clinical years, SBME was not perceived to be fit for purpose and was dismissed. During the interviews, non-compliance with the SBME framework was noticed. Some staff regarded the SBME as not deliverable and failed to integrate information on emergent teaching issues:

> *"They still don't understand what kind of teaching style can be called or named as medical simulation, and they still don't understand what teaching by Sim should be. How can it be combined with their subjects, especially pre-clinical educators." (Int Ref PCM1_1)*

In clinical years, staff prioritised clinical encounters with real patients' needs over SBME, stating that:

> *"It's not going to be much to replicate a classroom. As for the knowledge, the decision is usually that it follows you on the team. To see your brothers decide*

to order a lab, order orders, all these things is learning to work, which they won't see from simulation." (Int Ref PCM1_5)

Therefore, staff often overlooked SBME because it was perceived to be inferior when compared with delivery of traditional bedside teaching on real patient subjects.

In the time of the COVID-19 pandemic, tutors reflected that there would be more need for alternative SBME. They agreed the pandemic made them realise the challenge of a reduction of social interactions that occurred during the social distancing phase.

"Before, we probably didn't have much trouble with patients about the procedure because we had a resource. We had a lot of opportunities in our hospital, with and without supervision. There are a lot of patients, but when there's covid, it's clear that medical students can't get on the same experience." (Int Ref PCM1_6)

5.4.2 Cognitive Participation: Challenges in Legitimising SBME in Teaching Practice

Four key activities as mentioned in NPT: *1) relations workability selection, 2) enrolling supporters, 3) legitimising or defining possible contribution, and 4) defining actions and procedures needed* are used to examine the understanding of SBME in UG medicine from the PCM tutors and the available enacted SBME curriculum.

Similar to UoD, the "set up" activity aims at selecting appropriate attributes to use for the SBME structuring stage, Objective Structured Clinical Examination (OSCE) was used as templates to ensure structural integrity and relevance towards assessing learning outcomes and the identity to be formed. The "setting structure" activity was necessary at this stage as all the structure is needed for communicating with both non-clinicians and clinicians involved. Engagement with SBME interest was attempted but seemed unsatisfactorily convincing. A PCM expert commented on the result after the training programme was delivered:

"They still don't understand what kind of teaching style can be called or named as medical simulation, and they still don't understand that what teaching by Sim should be." (Int Ref PCM1_1)

It is important to mention that this activity was identified from conducting the case study as useful for performing cross-analysis between the framework and the enacted attributes of the two medical schools. In addition, the "investigation of the workability selection" in this medical school involved two more activities, namely *"structure identification"* and *"tutor recruitment"*. These activities are acknowledged as part of the implementation supporting functions.

The participant's belief and motivation in trying to incorporate the intervention with existing approaches are crucial for gaining cognitive participation and collective action from them. For the PCM tutors, the belief that SBME was unfit for the context according to what UG medicine educators' value influences the decision-making that delays activation of an SBME teaching practice and decelerating collective efforts by which SBME could be implemented. My findings revealed that participants face challenges in legitimising SBME in practice due to: (1) lack of understanding and support from the management team, (2) inadequate resources and (3) individualistic understanding of and perception of SBME.

Participants cited lack of awareness of simulated clinical teaching as their main discouragement (in interviews) and proposed it was not their responsibility to implement SBME. Additionally, SBME implementation seemed to be challenged by a feeling of unsatisfactory support, including the understanding of SBME and the need of SBME among non-clinicians and clinicians who have had adequate teaching resources, including patient subjects. Although it is a departmental based approach, lack of medical education assets was noticed (during interviews), both SBME knowledge and accessibility to physical resources (e.g., not enough access to the simulation centre and equipment). Conversations with staff revealed how their 'buying in' attitude towards implementation of SBME was significantly framed by the medical education context, particularly during the pandemic as one of the clinicians described:

> *"Our year six students have to do normal delivery to complete their EPA. There was a period that patients reduced from 300 to 100. It was the time that we had problems with nursing students. We had to use manikin sometimes. This was because the pattern of patients visited had changed as people moved back to their hometowns." (Int Ref PCM1_3)*

Medical education assets including inadequate time allocation diminished motivation and compliance were then considered to make the implementation impossible. Compliance with SBME was not considered feasible in many settings, for example, (during interviews) it was noticed no space was available for setting up SBME, scheduling was very tight and so there was very limited time for SBME.

Another challenge which staff and students encountered with legitimising SBME was the overlooking of accessible educational resources. Although clinical tutors described (in interviews) potential opportunities to create shared understanding and promote engagement in SBME teaching practices between tutors, the real patient encounters that were available and used in all clinical settings made them overlook the value of SBME. Interviews identified that bedside teaching relating to patients was visible throughout all sites and was the most reported valuable educational resources. Clarity and availability of real patients were highlighted by participants (in interviews). A tutor found patients easy to access, and there was no barrier to patient engagement in clinical teaching until the pandemic occurred as this quote from a tutor in a clinical department highlights:

> *PMK is also the largest military medical school during COVID-19. We had to reduce admitted cases to half and then surgery was only possible with cases in relation to emergency and specific cancer. The kid's inexperienced is a tragic case. (Int Ref PCM2_5)*

When medical educators or students focused only on their own susceptibility to traditional knowledge transfer, they tended to endorse assessment-based implementation of SBME instead of systematically contributing to collective monitoring of implementation. An individual perspective on susceptibility to traditional medical education can supersede compliance to SBME and lead to lack of engagement. A tutor illustrated this idea by reporting his reaction to many episodes of non-compliance in teaching. A lack of understanding of what they are expected to contribute made medical educators unable to participate (Wood, 2017), hindering their transition between traditional teaching and SBME teaching The tutor further explained (in interview):

"Many tutors are thinking that there are still limitations or barriers. This is not about having resources, but it is about how to use or teach by using more SBME." (Int Ref PCM1_2)

5.4.3 Collective Actions: Assessment-based Implementation of SBME

The "collective action" involves four activities under NPT constructs (Murray et al., 2010): 1) to identify a set of SBME teaching practices, 2) to build accountability and maintain confidence, 3) to allocate work to tutors, and 4) to manage resources and execute the protocols, policies and procedures.

In this case, all the SBME related activities have been used to complete the reflection and feedback loop, but only seen evidently in some of the departments in these medical schools. The stage began with selecting an appropriate scenario of SBME required from the required departmental outcomes. Given the learning objective, activities summative SBME was selected because the process was seeking for specific outcome assessment. Next, OSCE-based structuring was performed to complete the SBME structures deployment activity. It is important to clarify that tutors have options of using SBME. This PCM model is more suitable to use assessment-based structuring approach, the "SBME structure" is then planned to align with the complexity of the department learning outcomes required. This allowed the identification and the construction of outcomes to use for assessment. One of the surgeon tutors selected his SBME sessions base on requirements from TMC:

"It's mostly about how we simulate is using a surgical device and a simulator. In the pre-COVID period, TMC was only primarily concerned about the procedures required for our 6th year to be competent in before graduating." (Int Ref PCM1_5)

'Assessment-based implementation of SBME' involves medical educators and students performing actions based on departmental needs that demonstrate specific SBME practices. The data (from interviews and documents) revealed that these representations of SBME can be resources or procedures in relation to national licensing examination and military medicine

requirements. The SBME structure shapes the way people interact and indicates how SBME is operationalised in practice. When implementation is assessment-based, individual tutors tend to be more concerned about an objective representation of SBME, the identity, than about how to ensure SBME effectiveness, as described in interview:

> *"In the pre-COVID period, TMC was only primarily concerned about the procedures required for our 6th year to be competent in before graduating. The surgical department is responsible for evaluating 5 procedures, which is the basis that needs to be achieved at the end." (Int Ref PCM1_5)*

During data collection I noticed that staff often spoke about SBME without completing the steps of SBME which indicate when individual self-reflection and constructive feedback should be delivered in the sequence of teaching. Staff reported holding these important components as they delivered simulated medical education sessions as either a demonstration or an assessment. Although SBME is used, individual student's self-reflection was not adequately acknowledged, and feedback then was not consistently given to facilitate the learners toward improvement. An elite mentioned how the SBME was used prior to the pandemic:

> *"But, we may use different methods of feedback as we cannot do it with each individual. However, everyone will be experienced by finding the volunteer of the group, then use SP as a demonstration, and then give that advice there. This is what was done before Covid." (Int Ref PCM1_7)*

When SBME was being used mostly in PCM, only some of the students had received formal feedback. The way SBME is departmentally structured and used creates incomplete and unsystematic SBME patterns. These resonances on the way SBME practices are implemented differently help the researchers reflect on how the elements of SBME practice might be communicated, reintegrated, and support the issues related to implementation (Wood, 2017).

5.4.4 Reflexive Monitoring: Divided Reflection upon SBME

In the "reflexive monitoring" stage, O'Donnell et al. (2017) recommended implementors to 1) seek to determine how effective and useful the practice is, 2) evaluate the worth of a set of

practices, 3) appraise the worth of the program, and 4) attempt to redefine procedures or modify practices. All the objectives or implementations were departmentally achieved apart from identifying the SBME impact on students. The "evaluation of the worth of NL OSCE and military medicine SBME" was performed and a series of appraisals were provided for further continuous improvements which has been continuing for decades. Planning this specific SBME implementation was feasible because the availability of supports from organisation, such as leadership and budget allowance.

> *"I was ordered to take responsibility for designing combat casualty care for military medical and nursing students from four institutes. The course included online, flipped classroom, onsite and field training. This was where I found the effectiveness of simulation but it required huge amount of resources and financial supports." (Int Ref PCM1_2)*

Communal appraisal, in co-existence with individual appraisal, leads to attempts to modify or reconstruct a practice to enable implementation. However, I noticed that when reflexive monitoring was limited at individual or department level, attempts at reconfiguration of the medical school practice rarely occurred. Additionally, a department staff reported in interviews that collective appraisal of SBME implementation was not a common practice and not formalised. Collectively, SBME implementation was appraised mainly through information on occurrence (or not) of departmental assessments.

> *"We did not ask other wards, because, the first one, the existing curriculum is not an integrated curriculum, and each department would like to work in their own scope. In our emergency setting, I did not know how in Medicine educators taught our students, but that if it were us, we would focus something about shock and resuscitation." (Int Ref PCM1_1)*

It was also identified that self-assessment and student feedback, potential opportunities for monitoring practice, were not always used for educational purposes. Participants noted that practice was changed during the assessment, but reverted when it had been concluded,

evidencing the student's effect. When asked about the division of labour to enable operationalization of SBME, there was a consensus that SBME is not everyone's responsibility at the stage. However, data from interviews and documents revealed that clinical staff engaged in discussion with their colleagues about problems or barriers for implementation:

> *"Tutors were not familiar with simulation at the beginning and also the student performance. Now they are more familiar with SBME, especially when they have to comment on student's performance. It doesn't like when do it in front of the real patients." (Int Ref PCM1_3)*

The fact that tutors often did not receive sincere either negative or positive feedback on their performance in SBME teaching practice might inhibit the reconfiguration of practice towards implementation of SBME. Lack of routine procedures for monitoring implementation played an important role in the feedback loop related to the purpose or meaningfulness of a practice. This further reinforced the *conflict* or the lack of alignment of evidence with local practice.

> *"Only one group of tutors that fully implements SBME is Dr … and his ER colleagues. However, we didn't do much during the joint exercise as a result of time constraint and other limitation." (Int Ref PCM1_2)*

Staff did not build accountability and maintain confidence in each other when delivering SBME which was influenced by the type or level of tutor working contract (pre-clinical staff perceived as less accountable) or professional group providing SBME teaching practice:

> *"That's the main problem which we don't have. I have never seen when they are teaching, so I do not know what the real problem is or what the other departments have." (Int Ref PCM1_1)*

Overall, we found (from data sources) that in all settings time and institutional identity pressure can lead to departmental rather than systematic implementation of SBME. The need to have the work 'done' was found to lead SBME educators to reproduce SBME without reflecting on their effectiveness on each milestone of learning outcome development.

Although the same standards of SBME are considered good practice across integrated teaching settings, differences in patient availability and pace of pedagogies meant that SBME practices were prioritised or deprioritised. More collective efforts towards compliance were not seen in PCM compared with UoD. It was observed that even when staff acknowledged need for SBME, the understanding of integrated teaching and lack of time were used to justify not applying SBME.

Alternatively during the pandemic, tutors were required to adapt SBME practices (e.g, substituting clinical teaching with simulators use or using the online communication to support learning). Staff repeatedly engaged in innovative SBME activities, including SBME delivery and SBME station set-up. However, these activities were performed only once, and subsequently, the staff transitioned to learning with real patients on-site once the situation improved.

In a decision-making process, medical educators collectively prioritise—producing and reproducing—the current behaviours of non-compliance or adaptation of SBME. Some procedural deficits were acknowledged (in interviews) as being specific to the onsite teaching environment, something that 'everybody does', hence normalising and learning from the real practices instead of from SBME:

> *We didn't have many at the time, there were about 10 simulated patients circulating, one set used about 10 of them and kept changing the scenario. Here, when there's COVID, we need more patients because 10 kids aren't enough because this kid needs to report one case a week, or interview and examine a few patients. (Int Ref PCM1_6)*

It is important to note that the unfamiliarity of SBME was not observed only in the simulation center but across all settings.

5.5 Summary

This chapter focuses primarily on the results from Thai-based research. This chapter outlines the structure of Thai medical school, and how the profile of SBME in the organisation supports departmental SBME implementation. The pre-COVID-19 SBME displayed more 'face-to-face'

SBME in comparison to the COVID-19 SBME. As such, SBME tutors who are more acquainted with the 'face-to-face' manners were able to draw upon outcome-based curriculum to differentiate their SBME delivered through face-to-face SBME. Outcome-based SBME curriculum refers to constructing outcome or identified identity through assessment criteria, notions of health services and military medicine practices. It is less effective where the linkages between learning outcomes and identity are identified and SBME process and engineered learning environment are weak and less established.

SBME is facilitated by relationships, direct interaction and assessment. Interactions often underpin the face-to-face relationships that exist from a small-chunk simple SBME to a more complex SBME used in the Thai medical school. This study supports the existence of outcome assessment (Shumway & Harden, 2003) and identity formation (Norman, 2012; Tien et al., 2019). These labels reflect how SBME are driving a range of assessments that cannot be reduced to their role in assessing the national licensing assessment processes. Rather there is evidence that medical schools seek outcome-based curriculum strategies and outcomes that constructively align with broader values and practice choices. As such, there is evidence that outcome-based curriculum strategies are characterised by more deliberative and meaningful practices in tandem with SBME based assessment, further reinforcing the argument that outcome assessment and identity formation are not a continuum but rather a dualism as PCM graduates have to maintain the essence of military medical professionalism and to ensure that the care of individual patient whoever remains paramount (Norman, 2012).

My findings suggest that SBME experts' experience of the COVID-19 SBME has facilitated the reflection on the impact of the pandemic on their teaching, their (re)emerging and innovative SBME, and their awareness of teaching and learning quality. This study found that re-emerging SBME learning might be a valuable tool for teaching UG medicine at PCM in the future. SBME has become more acceptable for tutors and students. Current disruption in medical curricula has promoted acceptance and abundant opportunity to include SBME and blended elements in the PCM curriculum. The pandemic highlights the usefulness of both SBME and blended SBME

in teaching clinical medicine, concepts that were not previously held in high regard, particularly during the pre-COVID-19 teaching.

Chapter 6: Comparisons and Discussions: Revisiting Understandings of SBME implementation and Transformative Innovations in Scotland and Thailand

6.1 Introduction

The comparative and conceptual discussion presented here forms an important chapter in the thesis. It draws out some of the key findings that have emerged from the previous findings chapters and relates back to the conceptual framework in Chapter 2. As reported earlier, Chapter 4 has demonstrated the results about SBME implementation in a medical school in Scotland and Chapter 5 provided detail on the implementation of SBME in a medical school in Thailand. This Chapter explores the key similarities and differences found in each context of medical education to expose more generalisable lessons for SBME and wider medical education. The conceptual framework presented in Chapter 2, which was formed through the combination of transformative innovation (TI) and normalisation process theory (NPT), will now to be revisited and further contextualised. This is an important aspect of this study as the results have been confined to the context in which they have emerged and yet have not been fully conceptualised in relation to the framework and literature to which they are related. This discussion chapter primarily addresses the third objective of this research: comparing the role of context and how innovative SBME contributes to the UG curriculum in the two medical schools, and the wider implications of findings from a cross-cultural, comparative case study approach to SBME.

The two re-drawn TI/NPT frameworks expose similarities and differences in SBME implementation. The medical education context is first discussed to highlight how the Scottish medical school structures and mechanisms serve as an enabler to large-scale systematic integration of SBME as part of their UG curriculum strategies. This is particularly influenced by SBME tutors who are 'established in the SBME practice or who have experience and knowledge of SBME. By contrast, SBME implementation in the Thai medical school is far less beneficial for or supported by UG medicine tutors due to logistics and relative inexperience; medical education context in Thailand continues to be primarily shaped instead by easy access to real patients and practice in clinical settings, and clinical departmental needs.

Medical education assets are then discussed, starting with physical space (the simulation centre) and support. However, two intangible assets have emerged as particularly relevant and important in terms of supporting SBME. The importance of educational theory in both the Scottish and Thai medical school impact on implementing and sustaining SBME. Comparisons between the cases are illuminated through consideration of the NPT components of coherence, cognitive participation, collective action, and reflexive monitoring (see NPT). The role of health care needs and medical practices are then discussed and the reasons and implications about why SBME is overlooked in the Thai medical school are presented. Moreover, the role difference in SBME implementation in medical school structures and processes are examined as part of this analysis and the impact of curriculum embeddedness and integration in the medical curriculum is further demonstrated. Finally, learning outcomes are considered with reference to UG medicine implementers to highlight how these concepts apply in the Western Europe, and to some extent in the Southeast Asia contexts.

6.2 Medical Education Context

This chapter begins by presenting logic models of SBME implementation in the context of medical schools in Scotland and Thailand. The evidence informed implementation processes can therefore be regarded as 'thematization' which justifies the frameworks underpinning this research. The 'implementation' of SBME that has emerged in both Scottish and Thai medical schools are captured by colouring and directing elements within the diagrams. This can refer to processes or aspects of the implementation that are evident in the original NPT framework but lacking in the data, or it can refer to new elements that have emerged but are not captured in the original framework. The re-drawn conceptual frameworks are now presented.

In UoD setting (Figure 6.1), the recognition of the need for better prepared, competent doctors with appropriate skills and attitudes was captured in the 1993 GMC recommendations (Dacre et al., 1996; General Medical Council, 1993). The deficiencies in a range of development skills in the training (Bradley, 2006; Dacre et al., 1996) led to a change in the medical education landscape with introduction of the spiral curriculum and early exposure to clinical skills which have become commonly accepted as important medical educational goals in response to the

change of healthcare needs (Bligh, 1995; Ledingham & Harden, 1998). This medical education reform enhanced the development of simulation centres and simulation-based medical education, providing more flexible learning environments for students to develop clinical skills (Bradley, 2006; Ledingham & Harden, 1998; Rubin & Franchi-Christopher, 2002). The medical simulation embedded contributes to the creation of an integrated clinical educational model appropriate to be adopted across a 'continuous curriculum' (Ker, 2003). During the pandemic, SBME was prioritised and used in combination across the entire 'social distancing' period to provide resilience to UG medicine. Reflection and constructive feedback used in SBME remain central to the foundation for lifelong learning and continuing professional development.

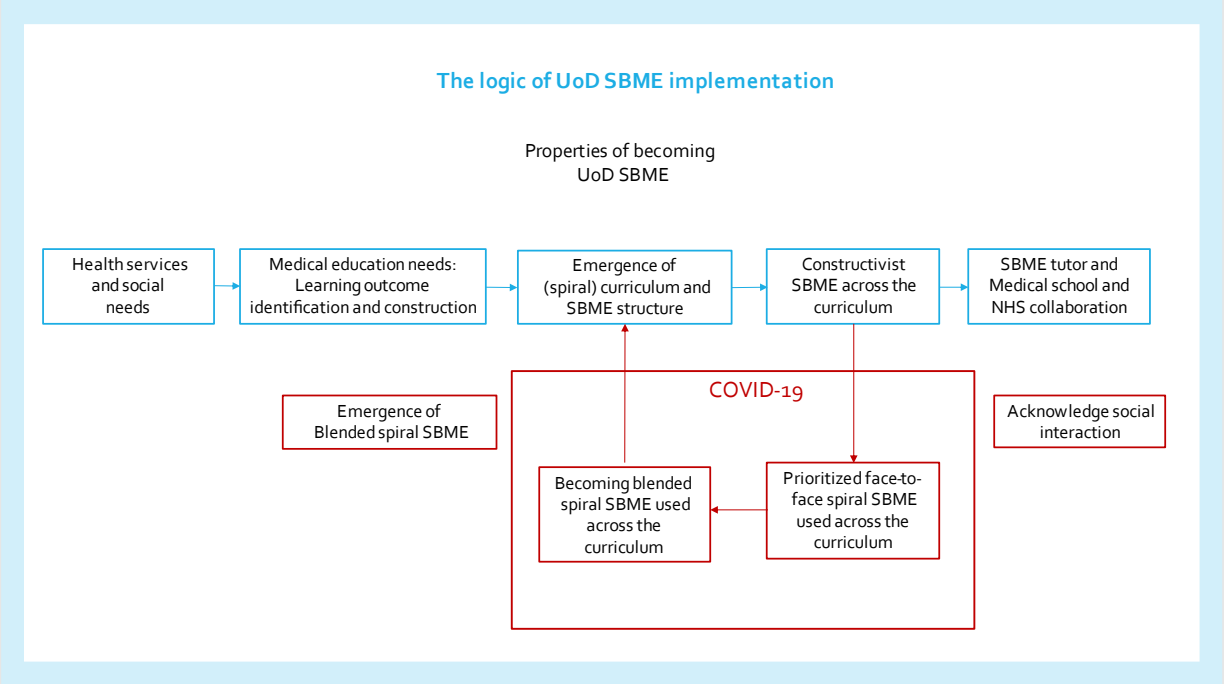


Figure 6.1: The Logic Models of UoD SBME Implementation

At PCM (Figure 6.1), the medical education change in Thailand was mainly an influence of international medical educational trends. SBME has been used in two main sub-divisions, clinical and military medicine (Phramongkutklao College of Medicine, 2015). SBME in civilian medicine functions for similar reasons as in other civilian medical schools, but as military medicine SBME teaching for specific exit learning outcome. Dual PCM SBME is structured and designed towards two specific exit learning outcomes to be assessed, clinical medicine (final

year national license OSCE) and military medicine (Operation Petcharavut OSCE) (Sathaworn, 2017). Having a temporary simulation centre and the dispersed implementation of assessment based SBME led to selective participation and engagement of UG medicine tutors who are involved in assessing medical students' skill development. PCM curriculum is designed based on traditional bedside teaching in real clinical settings (Phramongkutklao College of Medicine, 2015). During the social distance period, the value of SBME was re-acknowledged due to a lack of practice in clinical settings which had never had a problem in the past.

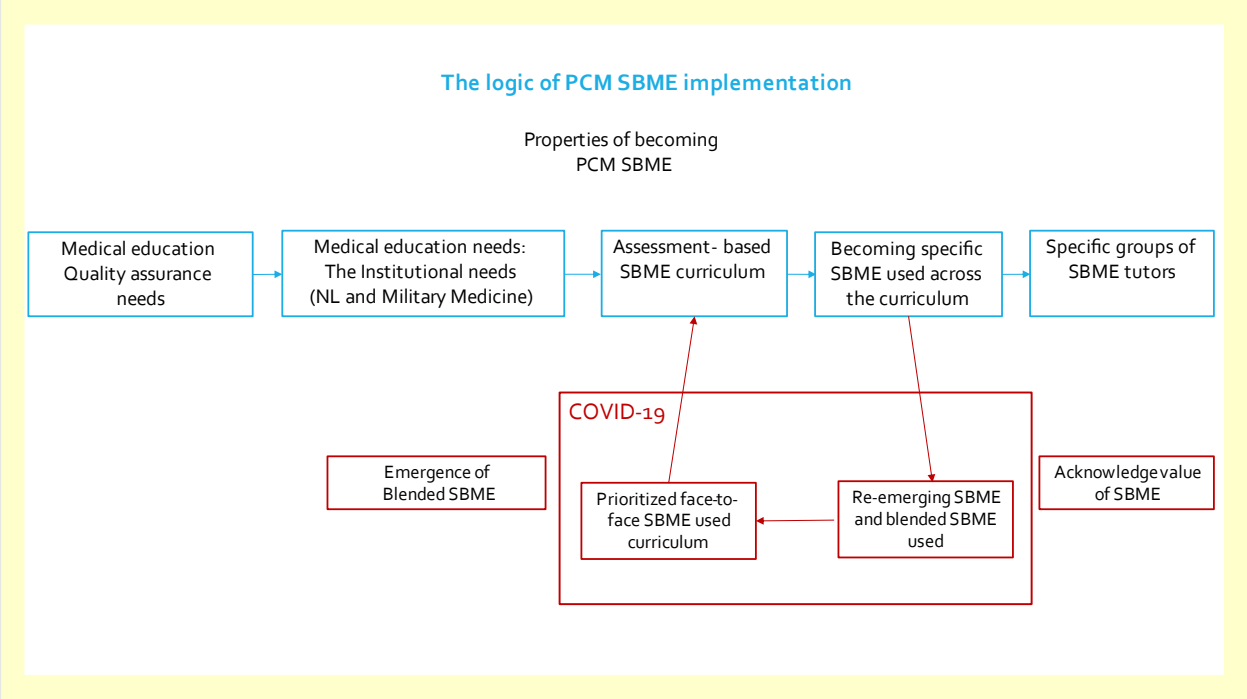


Figure 6.2: The Logic Models of PCM SBME Implementation

The presence and absence of different components of the new frameworks presented in this chapter are discussed in turn to clarify how and why they appear, the way they are implemented and the implications this has on the SBME used.

6.2.1 UoD UG medicine and SBME

In the UoD programme the focus of undergraduate medicine study primarily involved preparation of competent and reflective practitioners and incorporated large-scale systematic and diverse SBME in the Scottish medical school. Scottish medical education is influenced by

health services and governing bodies such as the GMC and SDMEG whose responsibility is to ensure that UG medicine standards and healthcare needs are met in a safely educated and trained manner. This is arguably a necessity given the nature of SBME, a way of learning clinical skills in a safe learning environment enabling future safe practice and learning before encountering patients.

A regulated medical education which is geared towards a more 'integrated' medical education system, is potentially a promoting factor for a large-scale SBME seeking to prepare medical students to enter the community of practice through SBME or other clinical placements. For each individual tutor, to help students understand the health service and medical education needs can be overwhelming due to knowledge overload and a lack of exposure to bedside teaching, placing more 'integrated' or 'emergent' SBME within such disruptive medical education environments at an advantage over less established counterparts. This overwhelming preparation was apparent with reference to a large-scale SBME implementation when tutors mentioned about the implementation they have to focus on:

> *"it takes time for people to engage and to see how helpful stimulation could be because here was a place where you could come and really focus on learners. Um, rather than having them on the ward and trying to teach them how to examine the chest on the ward and not being sure whether all 10 students learned the, the, the process." (Int Ref UoD1_4)*

UoD have set up their SMBE with some resistances to begin with. The main point regarding these negative responses is not the content, but the engagement of tutors. Although there is reference to unforeseen resistances by tutors, the effective result enacted has made it 'easy' to convince some of the enthusiastic tutors by way of spending their time and experiences. One SBME elite who used to and are currently working in the medical school comments that SBME creates and convinces meaningful outcomes and a more positive experience of the implementation. This elite commented on how UoD de-departmentalise, communicate and regain their SBME tutors' participation and collective action in the time of change.

Centralisation of the medical school management was perceived to disempower individual departments:

> *"At that time what we did was, um, we had university departments that were attached to the clinical areas. And what we did was we centralized, um, that sort of process so that we had, uh, uh, uh, medical school office. And so we brought in all the administrations from all the sort of departmental areas and it held them centrally, and that really, um, disempowered the department." (Int Ref UoD1_4)*

This elite also commented on how to gain cognitive participation and collective action from those tutors:

> *"I think the clinicians felt disempowered and I think they felt, I'm not part of the, um, they were a part of the processes, but it was being, it was being scripted for them whereas they would do teaching because they, they enjoyed it. They were enthusiastic and nobody really checked up on them. Here they were being asked to be part of a very much more systematic approach which demanded and enhance standards." (Int Ref UoD1_4)*

UoD implementation adopts a progressive professional and personal development approach which has been at the forefront of the enactment of a spiral and integrated curriculum (Hirsh et al., 2007). As such, UoD regarded the topic of implementation as 'part of a more systematic approach'. The experience and deeper knowledge attained through decades of UoD SBME arguably accounts for tutors' more positive attitude to participation in SBME delivery. This suggests that the well-established and more systematic SBME implementation makes SBME become familiar and easier for tutors to implement, and learners can fully benefit. Whereas UoD has articulated a systematic and continuum of development of SBME, PCM (later discussed) has had SBME that are dispersed as required by specific learning outcomes to be assessed.

A significant component of UoD for SBME delivery that promotes engagement in SBME is having clinical teaching delivery over two decades. The focus on 'quality improvement', more specifically the reflexive monitoring process, is part of the process of UoD SBME teaching quality assurance. Despite this being a labour intensive and time-consuming process, the purpose of monitoring is to ensure students entering SBME are progressing through the developmental milestones set. The elite mentioned how reflexive monitoring process has an effect on the use of SBME as teaching tool to promote learning:

> *"I think all the evaluation we've done, all the feedback from students is that the word simulation exercise is now much more useful to them. They see it as a, as, as a way of gaining knowledge of their performance as opposed to something they have to pass in order to pass fifth year. It never was a final exam, but we didn't in those days we didn't have a final year OSCE. um, so it in in people's minds it carried huge weight and the final assess, you know, portfolio assessment of, of the clinical skills, um, which actually detracted from the usefulness of it as a learning tool for students. They didn't let, they weren't interested in learning, they were interested in passing and that was all that really mattered." (Int Ref UoD1_5)*

Face-to-face SBME is the main means through which UoD teaches and assesses their students. The focus on development and reference to integration and progression towards achieving higher levels of learning outcomes within UG medicine is pertinent as this integration develops collective accountability which creates trust between tutors and students engaged in 'SBME' teaching. UoD ensures continuity through constructive alignment. This suggests that continuity and accountability is more about constructing experiences towards achieving exit learning outcomes, which serves to differentiate integrated SBME from other 'isolated' SBME approaches, and is founded in an adherence to constructivism. The student's experience is, then, constructed towards the exit outcomes:

> *"So in the first year they're fairly simple and relatively sorts stations, take a history, do an examination, you know, very chunked stuff. Um, second and third year I think that a little bit longer. Um, but it's still very much really do, do one thing that need, maybe by fourth year the stations are a few minutes longer. Often there's more in terms of putting things together. So it might well be, take a history, do the relevant examination and look at results for, for, for an individual simulated case rather than just do one bit…" (Int Ref UoD1_5)*

The emerging trend of using SBME as a student's development method is reflected in UoD and their curricula. UoD SBME is relatively well-established having started in the 1990s and is responsible for teaching and learning, quality improving and ensuring that appropriate and adequate educational facilities are available to construct the future of the students (Salman, 2021). When asked if tutors have considered introducing any improvements, such as quality assurance, they cited the spiral curriculum strategies as the main enabler, because of the focus created on achieving exit learning outcomes.

6.2.2 PCM UG medicine and SBME

Departmentalisation was a significant feature of the medical education context within the Thai UG medicine. This is an important point in the Thai medical school with multiple departments as these units play an important role in determining what will be taught. As a result of departmental outcomes being related to institutional needs, the delivery of PCM SBME depends on each individual department's identified learning outcomes and assessed. This means that the UG medicine delivered at PCM has at best a combination of multiple departments working independently to provide medical education and to satisfy the increased demand for country physicians. Academic tribes and territories were evident resulting in a loss of integration and the lack of constructivism. However, there was a heterogeneous collection of contributions from various departments (Bray, 2014). A PCM expert who is taking a role in providing SBME training courses for tutors commented on individualised SBME implementation:

"That's the main problem which we don't have. I have never seen when they are teaching, so I do not know what the real problem is or what the other departments have." (Int Ref PCM1_1)

The primary data collected during interviews with tutors from PCM demonstrated that academic tribes and their territories exist (owing to the departmentalisation) across departments and within departments. This meant that PCM tended to deliver SBME teaching within a particular department responsibility and specific discipline of medicine to supply UG medicine and possibly to expand their remit when demand increases in the medical school. As such, the departmental aspect to both SBME as well as UG curriculum in general, means that departmentalisation is an important characteristic of medical education context in this medical school.

Owing to the emergence of the country physician and the needs of the armed forces, the production of physician is becoming more assured which has come to characterise the PCM graduates. The current PCM policy suggests that the main and current objective is to deliver graduates for both parties. Military medicine becomes part of the curriculum to be taught alongside undergraduate general medicine. The PCM graduates are required to demonstrate military medicine and UG medicine learning outcomes, so needs to receive adequate training that meets two-fold needs and demands. They are expected to demonstrate the qualities of an effective platoon-leader level military unit commander during active combat operations, while also possessing a fundamental understanding of their own profession (National Defense Studies Institute, 2018) as well as demonstrate medical skills with a medical knowledge of their medical profession (The Medical Council, 2017).

SBME Implementation frameworks with reference to this study are somewhat different to systematic SBME in the Scottish context, at least in terms of continuum of learning (that PCM hardly provide). SBME used at PCM is more about demonstrating the educational quality required to be exhibited as opposed to meeting undergraduate medicine learning outcomes (national license) and institutional identity (military medicine). It is understood that SBME

encourages tutors to participate in SBME as a means to create a road to evidencing specific outcomes identified. Medical education quality frameworks in the Thai context are contributors to supplying specific needs as they can enable assessment-based SBME curriculum strategies in UG medicine. This highlights the importance of delivery of SBME, especially among those who are 'responsible' for its use for competency assessment (Davis, 2003), and delivery of relevant knowledge and teaching skills (Nuzhat et al., 2014).

Using SBME as student's assessment method is manifested in PCM and their curricula. PCM SBME was specifically started as assessment methods and is responsible for ensuring that adequate educational facilities are available to assess the identified outcome and allowing individual student to demonstrate skills required for being a medical graduate (Davis, 2003). PCM tutors cited the assessment strategies as the main enabler as the focus created on exhibiting the specific outcome measures.

6.2.3 Existence and Absence of Underpinning Educational Theory

One of the medical education assets that has had little mention in one medical school but very much on the other throughout the thesis concerns educational theory underpinning SBME. Unlike other medical education assets such as simulation centre and support, which have emerged as significant themes in terms of SBME, the notion of educational theory received less attention in the Thai medical school context. The concept of constructivism has been referred to in Chapter 2 as part of a discussion about the 'continuity' and 'outcome construction.' In terms of results and findings, educational theory was referred to in relation to curriculum design by interviewees, but this was much more evident within the Western Europe context.

SBME practices that should be associated with outcome identification and outcome construction, such as constructive alignment amongst UoD participants suggest that aspects surrounding 'constructivism' are important when it comes to curriculum design and SBME implementation (Bradley & Postlethwaite, 2003). As such, Harden (2007) comments that learning outcomes and exit outcomes should be defined since they encourage student progression and enable monitoring of students' progress. Delivering outcomes within the

context of an educational theory appears to constitute an important element across the medical school curriculum. One UoD elite interviewee reported how constructivism was applied:

> *"…we want to make sure that students are getting the opportunity to practice and role play situations before they're trying to do it in real life. So building up a kind of graduated experience with as same as I mentioned, really in the assessment side of things. So we can be sure that we've controlled as many of the parameters as possible in a simulated environment before real life the students to move on to that, into the complexity of the real life environment." (Int Ref UoD1_1)*

Of greater significance within this research is the way SBME is used and where it is delivered, as well as whether it meets defined UG curriculum outcomes. Although SBME used as 'objective structured clinical examination (OSCE)' has been highlighted in both the Scottish and Thai curriculum (Figure 6.1 and 6.2), it is not equally demonstrated from the evidence how SBME has been used. There is less emphasis on the way tutors in the Thai medical school practise SBME compared to the Scottish medical school. It is possible to claim that the process of constructivist SBME is not acknowledged amongst the Thai tutors as the focus of their SBME teaching depends upon an assessment of specific outcomes and an availability of real patient subjects encountered in real clinical settings. The Thai counterpart evidence demonstrated that SBME was initially used for assessment purposes until the emergence of pandemic where there was a lack of practice in real clinical setting reflecting an increased demand for SBME:

> *"Before, we probably didn't have much trouble with patients about the procedure because we had a resource. We had a lot of opportunities in our hospital, with and without supervision. There are a lot of patients, but when there's covid, it's clear that medical students can't get on the same experience." (Int Ref PCM1_6)*

The adoption of an outcome-based model with constructivism underpinned promotes not only continuity, but also the ownership of the curriculum (Hirsh et al., 2007). The UoD model identified the exit outcome and an outcome construction strategy to support learning by linking learning experiences between and across clinical specialties and enhancing the development of competency and practice. This continuity is vital to SBME implementation in UoD as it fosters student-centredness by establishing more opportunities for building knowledge on what the student already knows and increases the level of difficulty. This area had recently become an issue of interest in the PCM context as one PCM elite interviewee reflected on SBME and its teaching processes.

> *"Before, here we were not very knowledgeable and very much about sim. OK, that what we're going to do this today, let's see what the procedure is, let's see if the kids can do it or supervise them and then it's over, and then it's over, there's no link, there's no feedback, there's no reflection. Actually these things are actually going to be useful, so try to get the teachers to learn here. These are what we're trying to slowly expand." (Int Ref PCM1_6)*

6.3 Medical Education and SBME Context

6.3.1 Medical Education Assets: Healthcare and Medical Education Capital (Micro and Macro Environment)

Under the current UoD UG medicine curriculum, simulation is systematically integrated and constructively aligned. Embedding SBME in an integrated fashion supports the view that this is important (Bradley & Postlethwaite, 2003). Tutors are adequately supported to engage in the formal SBME, ensuring that they provide constructive feedback. Clinical skills learning facilities provide access to a range of models, mannequins and the medical equipment required that support proposed teaching and learning methods. The flexibility of a physical environment that can facilitate a range of clinical settings with technical and technological supports, increases the chances of engaging enthusiasts from a variety of backgrounds and needs.

The former UoD simulation office is located in the medical school and provides flexible learning facilities. This meant that the simulation centre and entire support network is accessible for various disciplines. Location, facilities, labour, and accessibility underpinning utilisation exist to support the continuity of spiral curriculum strategies (Bradley & Postlethwaite, 2003), and so, this form of medical education capital appears to form pre-requisites for effective SBME. This may apply to any context where curriculum focuses on a spiral or constructivist model, but the issue is far more pertinent in a global north context where reduced experiences in real clinical setting are an issue led to insufficient individual skills learning and SBME is indispensable. This clearly undermines the medical education assets of medical schools which directly use the resources by access to an existing centre. As such, simulation centre is an important space of the medical education context delivering spiral and student-centred SBME:

> *"it takes time for people to engage and to see how helpful stimulation could be because here was a place where you could come and really focus on learners. Rather than having them on the ward and trying to teach them how to examine the chest on the ward and not being sure whether all 10 students learned the, the, the process. Whereas in a simulation centre, you, you've really got to make sure that every single person has the opportunity to, to learn and practice and to use part task trainers or models as, as is appropriate. And to give the students that have some feedback." (Int Ref UoD1_4)*

One of the most important factors affecting the medical education context in Thailand is the availability of medical education assets. In terms of SBME assets, the simulation centre was disregarded as part of the UG curriculum as the PCM nature of the clinical skills training. In this instance a simulation centre required to support learning seems to be a poorly developed. For PCM, this simulation centre was not perceived as an asset that must be used due to the availability of exposing students to real patients. Indeed, the practice of 'real patient encountering' is more common as practice in clinical settings contributes to the teaching and assessing of clinical skills competency. This was deemed preferable as the assessment needed

to be done in real clinical settings as stated in the manual for EPA launched in the time of pandemic (no simulation provided as an option):

> *"Contexts: Bedside or Outpatient Department*
>
> *Patient conditions: Not in unstable conditions or vital signs"*
>
> *(PCM EPA Manual)*

For the tutors who were interviewed in the Thai medical school, SBME was shown to have been used in some departments. In all cases SBME was not claimed to be owned by and belonging to the simulation centre, but there was an official supporting documentation to substantiate each individual departmental claim. It highlights how powerful departmental actors can play an important role or lay claim to departmental SBME. Simulation centre staff seemed to work for but not work with other departments. They were disempowered for overseeing a programme of skills learning and curriculum development roles to ensure an alignment between clinical skills and other elements of the curriculum. With proper tutor training strategies (Salman, 2021) and constructivism (Bradley & Postlethwaite, 2003) used to support the development of SBME, these professional barriers can be reduced.

The empirical findings from this research reinforce the importance of healthcare and medical education assets within the context of SBME. These two main capital assets are inter-related when the role of UG SBME is examined. The healthcare and medical education assets had an effect on the initiation of SBME, both Scottish and more traditional Thai UG curriculum and structure. This knowledge may not be confined to these two medical schools where lack of exposure to real patients occurred during the pandemic (Gasmia & Benlamri, 2022; Kapoor et al., 2021), as knowledge is reflected through existing networks within their communities. Interviewees explained how the change of healthcare landscape affected the adoption and the use of SBME. For example, the Scottish elite interviewees explained that as a result of reduction of patient encounters the medical school had to offer to engineer the learning environment for medical students who were having problems integrating and gaining experience in medical practice. Thai tutors mentioned the reduction of patients arising through the pandemic affecting teaching and assessment. The pandemic situation later made the PCM tutors realize

the value of SBME when there was difficulty in accessing real patient subjects. These examples highlight how knowledge and practice can be changed once a disruption occurs and catalysed the innovation of medical education assets.

The SBME support from potential teaching and support staff networks available remained reliant on healthcare and medical education learning needs throughout the years. The main needs would be teaching staff network support from the medical school and local healthcare services as face-to-face learning activities and relations between tutors and students is required. As Figure 6.3 shows, the presence of simulation centre and coordinators enabled SBME tutors to not only enhance their knowledge and teaching skill set. Bringing in enthusiast staff into the clinical skills centre to take part in SBME teaching helps UoD expand a sense of SBME ownership across the wider teaching community (Bradley & Postlethwaite, 2003). SBME tutors cite pre-existing relationships with SBME made through being either an enthusiast or having an interest in SBME, such as past experiences as a learner or a tutor.

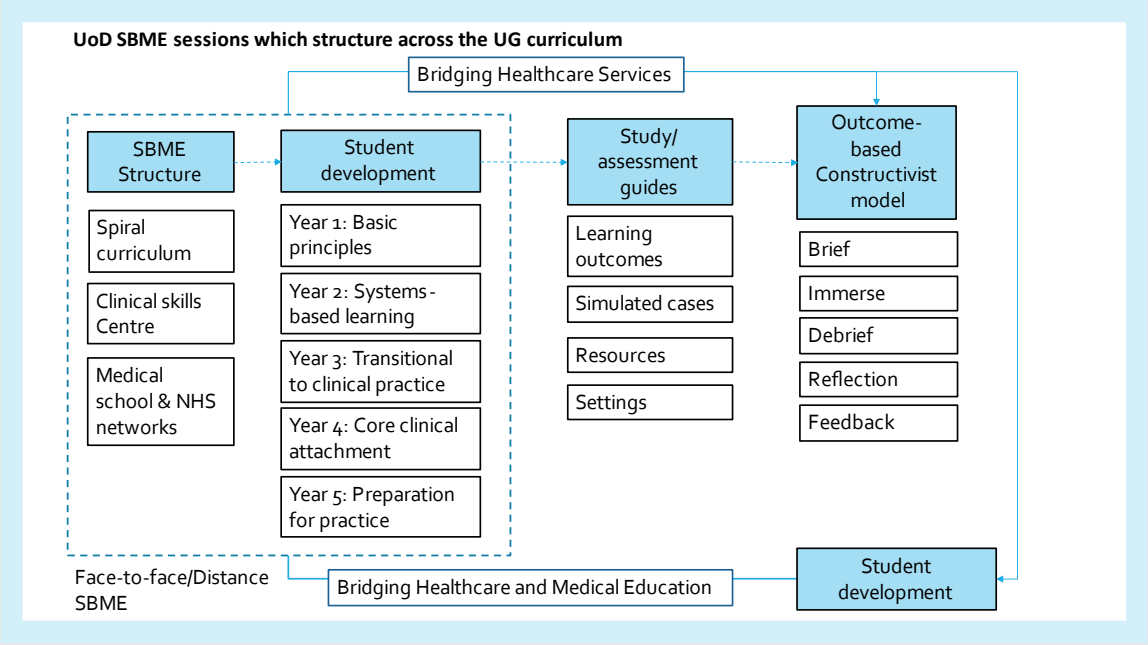


Figure 6.3: An Overview of UoD SBME

This may hardly be seen in PCM (Figure 6.4) as SBME has been only partly used in some of the departments, the simulation centre has recently been established, and a staff development programme has recently been introduced.

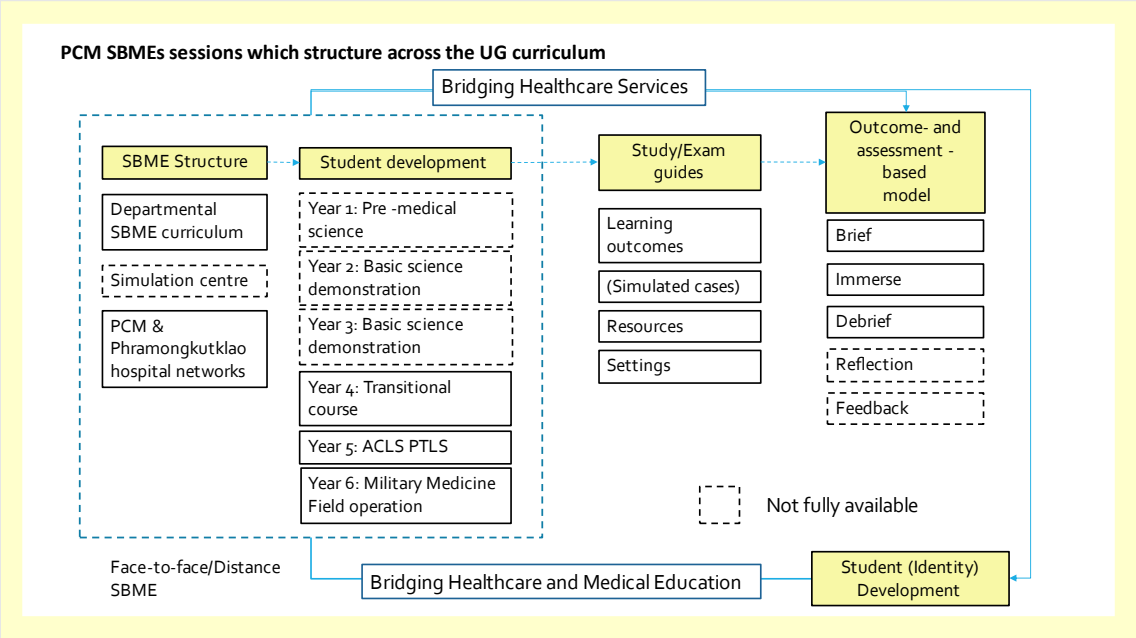


Figure 6.4: An Overview of PCM SBME

As in lower half of Figure 6.3-6.4 shows, UoD and PCM utilize both bonding and bridging healthcare services in medical education as tutors can draw upon both the SBME structures and their day-to-day practice to facilitate these types of teaching. The direct relationship between healthcare practice and medical education that translates to SBME including disruptive SBME is evidence of how healthcare service (clinical practice) and medical education needs are drawn upon to disseminate SBME, face-to-face and distance learning that do rely on steering media (study guides/assessment guides) and mechanisms (recruiting and training enthusiasts). Moreover, SBME tutors also refer to the constructivist model used in the Scottish medical school suggesting that such types of SBME are rich in curriculum embeddedness and continuity. This highlights how SBME structures and processes – curriculum embeddedness – is drawn upon to create the spiral SBME curriculum in the Scottish medical school (Bradley & Postlethwaite, 2003).

This is in contrast to the Thai situation where specific outcome-based examination requirements divide up the curricular requirements such as national license examination and combat casualty care in military medicine. The Thai medical tutors also elaborated that bridging healthcare service needs and the curriculum and associated exit learning outcomes has had an impact on outcome construction. This does not mean that the Thai model is not used to seek out SBME, but without de-departmentalisation and proper teaching staff training in place, the continuity cannot be seen through constructive alignment (Salman, 2021). As one of the interviewees commented, the existence of military medicine in real but specific clinical settings requires a special simulated environment separate from normal hospital-based practice:

> *"Some situations are really difficult to be trained in real settings. It's necessary to simulate it so that people who have to work can work in stress situations, and there are many problems in front of us in stress. It needs training, it's not using only knowledge, it's skills related, it's mindfulness. It needs training." (Int Ref PCM1_4)*

Since the pandemic and subsequent emergent lack of exposure to patients, PCM was able to utilise more SBME to bridge healthcare and medical education needs to generate blended SBME to be used with students during the social distancing. This scenario resulted in an enhancement of SBME utilisation and its value as the potential for supplying learning needs due to the reduction of clinical exposure has increased. PCM capitalised on SBME implementation associated with the reduction of patient encounters. This is why in Figure 6.1 and 6.2 local healthcare problems or needs are connected to the situation that occurred decades ago in the Scottish medical education and what became more evident in the Thai medical education during the COVID pandemic. This is also why, during the COVID-19 pandemic, SBME transformative innovation in the Thai system is more evident when compared to the Scottish system.

6.3.2 Medical Education Coordination: Simulation Centre and Supports

Strategic leaders or coordinators are vital in enhancing SBME through their expertise and transfer of knowledge as they are responsible for overseeing a constructive alignment that bridges clinical practice and medical education towards achieving the identified outcome (Bradley & Postlethwaite, 2003). As shown in Figure 6.3 and 6.4, the simulation centre and coordinators are required to disseminate a multi-stage SBME teaching processes and seek to distribute clinical practice through face-to-face SBME. Owing to the SBME embeddedness in the local context, processes such as outcome identification and outcome construction should be collaboratively designed and systematically encompassed in a tentative plan. This is why the re-drawn framework in Figures 6.3 and 6.4 connects the UG medicine curriculum and processes with face-to-face SBME in outcome-based medicine. The bridges with healthcare practice evident within both settings illustrate that there are also strong linkages between healthcare and medical education in innovative transformation processes.

The Scottish (face-to-face) SBME directly communicate the formal structure as the simulation centre is responsible for these direct, local medical education networks. These are communicated to tutors through study guides (steering media). As noted in Chapter 4, the local clinical tutor networks are often a 'steering mechanism' when SBME is implemented, most notably during times of gaining collective action or where the reflexive monitoring occurs (Figure 6.3). This productive strategy is arguably an outcome of embeddedness between SBME, the UG medicine curriculum and supporting organizations, the medical school and the hospital. This may account for why linking healthcare assets resonates with SBME embeddedness which is noticeable when exposure to real patients is reduced during the disruptive social distance context.

The simulation centre was a limiting factor in the Thai medical school more so than the Scottish context, as being departmental SBME typically lacks the investment in a bespoke simulation centre and resources. This is why in Figure 6.4 the simulation centre was not clearly mentioned (not fully available). Key informants commented that following from the plan for the simulation

centre. The medical school is now offering budget allocation to assist SBME in making a transition from traditional to more integrated teaching. As a result, PCM lacks the technical and financial support such as access to technical expertise and micro-finance to invest in physical assets. A PCM elite mentioned SBME:

> *"these sim s will be seen more also in a new curriculum, it's a policy to push sims in more because we're getting more resources, I think the part that we probably haven't talked about sim based a lot yet is because we didn't have resources." (Int Ref PCM1_6)*

This situation is in contrast with the Scottish medical school where access to support including budget is much easier as there is a director representing the centre responsible for academic and management. Improving medical education teaching by investment from e.g., Additional Cost of Teaching (ACT) funds allows a greater degree of support over SBME. As such, the medical school is able to sustain the continuity of teaching. The role of clinical skills centre director is captured in the following comment:

> *"I think there also needs to be at an academic team in house with someone who has I guess so a director status to be able to go on influence and sit on boards and fly the flag, I guess, for the center and how it can help deliver the curriculum and then they need a sidekick at the very least kind of mind you doing here." (Int Ref UoD1_2)*

This is why the simulation centre and supports have been highlighted in Figure 6.1 with reference to the Scottish medical school. Moreover, as noted in Chapter 4, the simulation centre serves as an enabler to SBME in Scotland when compared to Thailand. The infrastructural efficiency and continuity in SBME implementation make SBME delivery even relatively satisfied during the social distance particularly.

6.4 Understanding SBME Implementation through NPT Implications

Medical education is concerned with the relationships that are needed to facilitate the implementation of SBME. These relationships are dynamic and there is a set of factors that can determine the transformation of UG medicine teaching and the innovation that tutors make for learners. Healthcare service, medical education, and access to medical education support all have important roles in SBME implementation. As with Thailand, the important role of healthcare and medical education assets for SBME in a Scottish context is evident. The discussion now focuses on the relationship that exists amongst SBME NPT related factors throughout the implementation, as the collaborations and networks SBME tutors form with one another has emerged.

At UoD (Figure 6.5), the investigation of UoD SBME provides an insight on how it overcomes local context barriers and translate SBME into practice. Overall, healthcare problems from a lack of patient encounters, and GMC pressure, building competent and reflective practitioners, influenced (and were influenced by) and shaped tutors' teaching practices towards integrated teaching. SBME in this UoD spiral curriculum were perceived to be fit for purpose for building up the graduated experience towards the exit learning outcomes. The spiral curriculum and teaching practice alongside challenges and enablers legitimate SBME in practice. This sense of unity of SBME and shared reflection on SBME practice led to workforce collaboration and triggered the actual implementation of the SBME. Adequate resources and supports including SBME training and regular monitoring procedures promote the development of SBME local teaching practice.

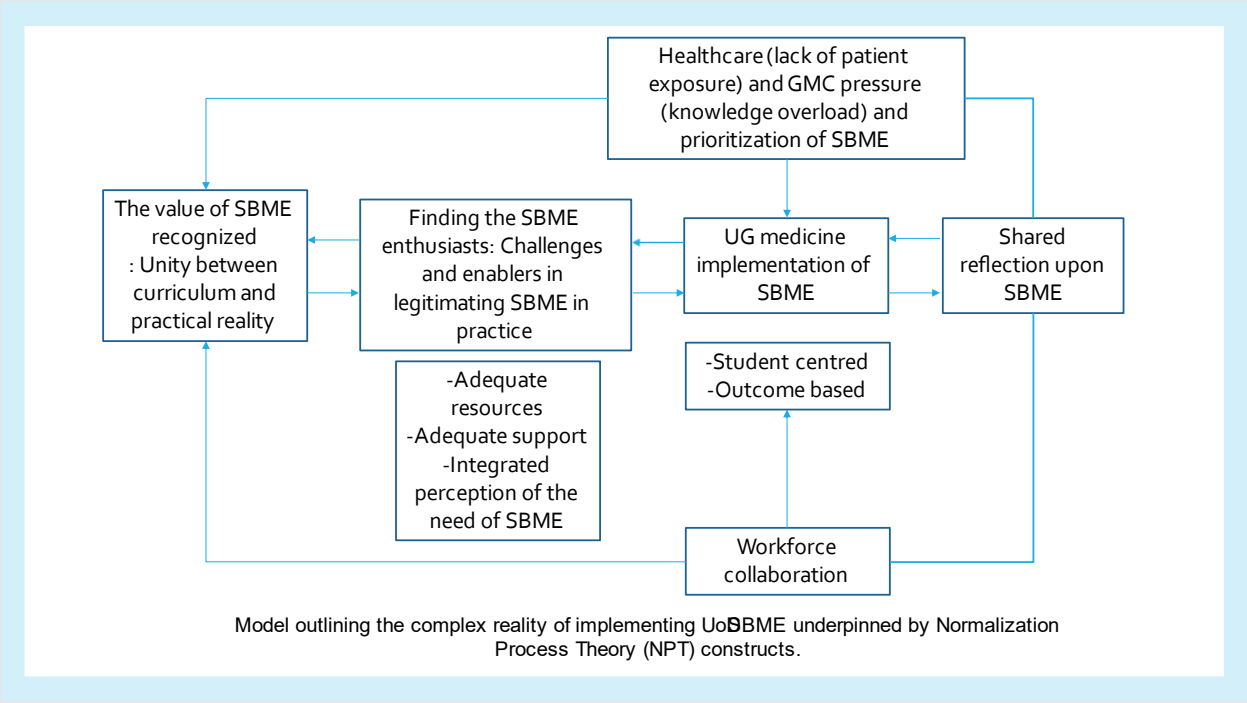


Figure 6.5: A Model Outlining the Complex Reality of Implementing UoD SBME

At PCM (Figure 6.6), SBME is highly dependent on learning outcomes and their assessments to be measured and demonstrated. SBME implementation seemed to be operationalised by adherence to assessments required, national license examination and military medicine competency, rather than spiral curriculum strategies. The assessment required alongside challenges and enablers legitimate SBME in practice. The existence of departmentalisation and departmental responsibility divided reflections on SBME practice, workforce understanding and triggered the departmental implementation of the assessment-based SBME. This lack of shared reflection on SBME practice led to selective workforce collaboration and limited implementation of the SBME. Inadequate resources and supports including SBME training and regular monitoring procedures inhibit the expansion of sense of ownership.

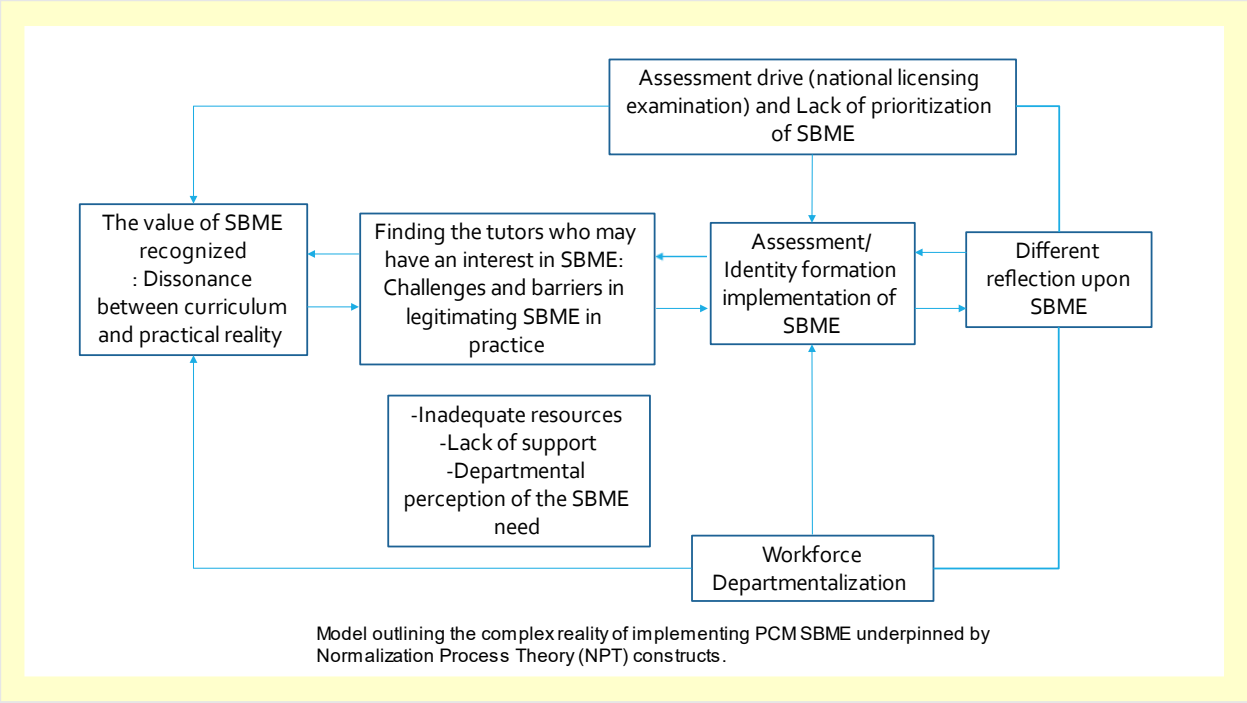


Figure 6.6: A Model Outlining the Complex Reality of Implementing PCM SBME

The study findings describe data from interviews and documents used in the implementation. According to the findings, the data demonstrates that interviewees regarded the UG SBME as legitimate innovation in their activities (cognitive participation) and that SBME were interactionally workable (collection action) for them. Therefore, the two medical schools did enact their SBME. Additionally, they constructed a set of meanings for their SBME implementation, that gave this as teaching practice significance. The results of analysis revealed interconnected themes in relation to the SBME implementation which resonated with the constructs of NPT (see Table 6.1):

Table 6.1: Comparative Themes in Relation to NPT Constructs

Themes	UoD	PCM
Coherence	Unity between SBME curriculum and practical reality	Dissonance between SBME curriculum and practical reality
Cognitive participation	Systematic UG implementation of outcome-based SBME	Departmental UG implementation of assessment-based SBME
Collective action	Challenges and enablers to legitimise the systematic SBME in practice	Challenges and barriers to legitimise the systematic SBME in practice
Reflective monitoring	Shared reflection on SBME practices.	Different reflection on SBME practices.
Workforce collaboration	Workforce collaboration	Workforce fragmentation
Theoretical frameworks	Student centred and outcome-based education	Outcome-and assessment-based education

The relationship between themes is depicted in Figures 6.5-6.6 (Table 6.1) above. This illustrates how NPT constructs underpin the analysis for UoD (chapter 4) and PCM (chapter 5) logic models. Similar to the four NPT constructs, the themes interact dynamically and non-linearly to provide an explanation of SBME implementation in UoD and PCM contexts.

The following sections examine the understanding of SBME implementation in each stage of NPT in detail. The aims are to identify the micro and macro environment affecting the implementation and provide an understanding of NPT constructs over the period of pre- and during COVID-19 pandemic. Therefore, it is important to investigate whether micro and macro environments have provided the required resources and functions to later execute the disruptive SBME implementation process. The discussion highlights essential aspects that could promote actual implementation including facilitating roles such as interventions to promote alignment of curriculum with outcomes and local practice as well as SBME training and regular procedures to monitor SBME teaching practice.

6.4.1 UoD NPT Constructs

There is a sense of unity of spiral curriculum and SBME teaching practice alongside challenges and enablers to legitimise SBME in practice. Implementation was often operationalised by

adherence to the recommended spiral curriculum rather than through reproducing SBME symbols. Shared reflection on SBME practice, workforce collaboration and healthcare service pressure further triggered the actual implementation of the SBME. Most of the UoD tutors commented on SBME purposes as:

> *"…building up a kind of graduated experience with as same as I mentioned, really in the assessment side of things. So, we can be sure that we've controlled as many of the parameters as possible in a simulated environment before real life the students to move on to that, into the complexity of the real-life environment." (Int Ref UoD1_1)*

Consistent with Holden & Von Kortzfleisch (2004) and Nonaka (2007), the study highlights how the medical school starts the implementation with making sense of and creating a new common cognitive constructivism ground; this is important because it is likely to contribute to success of implementing spiral SBME. The elite responded on the SBME implemented:

> *"...there's a very clear progression in terms of, of complexity and also probably degree of simulation as well. And that at first, second year just here's a simulated patient who will give a history or allow themselves to be examined. Similarly in the fifth year OSCE, they will be uh, you know, usually an acute care station." (Int Ref UoD1_5)*

Additionally, the sense of unity between SBME stakeholders and UG medicine staff illustrates positive sense making toward SBME. This positive perception of SBME policy corroborates Hodge et al.'s (2008) empirical work on integrating simulation across curriculum. In this study, elite interviewees were keen to present the implemented SBME as experienced system and always follow policy with what they perceived to be based on 'outcome-based spiral curriculum'. An alternative for developing positive sense making towards SBME is the integration of SBME within other accepted and established UG medicine programmes. For example, SBME teaching and assessment, which has some common core components of clinical teaching and assessment already in place (Epstein, 2007).

Analysis of participants' understanding of SBME revealed a belief in the relevance of SBME to the local medical practices. Positive perception seemed to influence collective action towards actual implementation of SBME in which SBME study guides tended to direct delivery as planned and mapped (e.g., more outcome aligned). Similar findings are described by Hodge et al. (2008, P. 214) who suggested that 'faculty must work together to assure that this valuable technology is more than an expensive piece of equipment waiting for someone to turn it on and that simulation experiences do not replace experiences in which students provide care to real patients in actual clinical settings.' The authors describe that tutors with positive perception of SBME expectation and the effectiveness of SBME would make them feel more comfortable to use than suffering 'fear of unknown'. The elite supported the collaboration and experiences from local practice:

> *"I thought that we had to have practicing clinicians delivering clinical skills education in the sim center because if you just had people who were just totally, um, there, so I did one day a week up until last year in general practice because that, I thought that was really, really important in order to deliver a simulation-based education. Cause you, you would bring stories from your practice into the, into your teaching." (Int Ref UoD1_4)*

It can be concluded that UoD SBME are more complex. Similar to the concept of 'spiral curriculum' (Harden, 1999) SBME teaching practices are learnt, legitimised, embedded and sustained in UG medicine settings and seemed to rely on physical interactions perception of exposure to integrated clinical teaching. Tutors were encouraged to reflect on design and alignment before deciding to adopt or change a medical education intervention as isolated implementation of SBME practices might act as an obstacle to the integration of medical knowledge and the continuity of learning. For example, in the final year, the use of final year ward simulation (FYWS) is encouraged when this sophisticated simulation is required to prepare students to be able to work with other healthcare personnel and communicate with their patients. This adaptation of study guides to a current and local practice covering the activities should be considered a priority which could increase the compliance with study

guides. Gardner et al. (2015) highlighted the importance of acknowledging local needs and engaging stakeholders to increase SBME compliance more effectively than traditional teaching.

The demonstration of aligned evidence with medical education priorities and practice is acknowledged within the innovation literature (Brown, 2013; Underman, 2015). The alignment of evidence with learning needs requires tutors to assess and understand ways that SBME practices affect learners. Within this study, regular procedures for monitoring teaching practices (e.g., discussions and feedback regarding quality improvement) seemed to have a positive impact on SBME implementation. GMC quality assurance processes endorse monitoring and feedback as an integral part of implementation and suggest, for example, the effect of SBME on learners. In this study, tutors monitor students' feedback and their programme is ranked and rated, this is similar to findings of another study applying NPT in the context of new interventions implemented (Jones et al., 2016). Sharing information on students' feedback and effectiveness in the SBME teaching, could be used to trigger a reflexive monitoring process, promoting a shift from SBME as a 'pilot teaching'—as reported in the findings of this study—to collective actions. This sense of collective responsibility requires ownership (individual accountability) for SBME teaching.

The emergence of ownership for SBME implementation requires core organisational support to tutors; this enables a more creative engagement from tutors in response to problems. Ownership means that tutors have access to their own metrics (e.g., rooms, resources and simulated patients) and contribute to teaching reforms (Law, 2014). They engage in designing SBME chunks to ensure accurate, continuous delivery and have meetings to learn from them.

To move SBME beyond the implementation of 'isolated' session and 'simple' implementation, similar to Hodge et al. (2008), it is suggested that there are three interventions for planning for integration of simulation throughout the curriculum: (1) a communication to those classified as SBME enthusiast; (2) presenting relevant evidence that SBME can be effective, to those who are close to enthusiasts; and (3) securing systematic engagement between SBME and all tutors involved through the coordinators. Based on the evidence from this component of the study,

aligning SBME with local UG medicine curriculum is an essential means to increase the sense of unity and represents a critical step towards successful implementation. There are strategies used to promote alignment: integration of SBME within other organ systems; and education acknowledging belief and value in SBME. These underlying strategies can contribute to tutors' engagement with the implementation.

6.4.2 PCM NPT Constructs

Although SBME was partially or departmentally implemented in PCM, it is consistent with Holden & Von Kortzfleisch (2004) and Nonaka (2007), highlighting how the medical school starts the implementation with making sense of new common cognitive ground and then conversion to explicit success of implementing specific SBME programmes. On the contrary, lacking sense of unity between groups of SBME stakeholders and UG medicine staff illustrates negative mindsets toward particular SBME for mastery of given procedures or techniques over practicing in real clinical settings. Through, departmental SBME supports Pock et al. (2013) work on integrating simulation supporting 'mastery education'. In this case study, prior to the pandemic, PCM tutors were hesitant to present the SBME implemented as an experienced system and not all of the departments complied with the policy. Nevertheless they perceived to be based on an 'outcome-based and assessment-based model'.

The above discussion highlights how some participants make sense of and accept changes; this is important because it is likely to contribute to the success and sustainability of implementing departmental SBME. The sense of dissonance between SBME and local teaching practice illustrates fixed mindsets towards UG curriculum and SBME implementation. This perception of SBME challenges the empirical work of Tien et al. (2019) on employing reflective practice in medical students. In this study, tutors were able to articulate knowledge in their practices, but did not always emphasise self-reflection and constructive feedback that are embedded in the nature of SBME practice and more readily translated into practice. As PCM SBME focuses on summative assessment, without proper constructivism ideology, the learning from SBME then overlooked discussions and feedback regarding student improvement. As for developing

positive sense making towards SBME, it was found during the pandemic, the re-emergence of SBME and the integration of SBME to replace real patient encounters as accepted in established UG medicine programmes.

Analysis of participants' understanding of SBME revealed partial understanding of the implementation of SBME. The value of SBME, especially for those non-clinicians who do not know how to adapt it to their teaching and the clinicians who have enough real patient subjects to use in their clinical teaching in the real clinical settings in PCM context, was questionable. 'Fear of unknown' mindsets seemed to influence collective action towards the implementation of PCM SBME. One of the PMC tutors commented on SBME understanding:

> *"They still don't understand what kind of teaching style can be called or named as medical simulation, and they still don't understand that what teaching by Sim should be. How can it be combined with their subjects, especially pre-clinical educators." (Int Ref PCM1_1)*

The assessment-based SBME study guides tend to be delivered as planned (e.g., identity to be formed or outcomes to be assessed). This finding is not similar to what was described by Issenberg et al. (1999, P. 865) who suggested that 'new technology and the changing medical education environment is likely to ensure that the use of simulators will continue to increase.' They described that the key element is to familiarise the tutors by acquiring SBME expertise over time from an integrated SBME throughout the entire curriculum which would make them feel less fear the unknown.

Existing PCM departmental SBME are somewhat complex in providing appropriate SBME teaching practices around the implementation of SBME. Similar to the concept of OSCE (Davis, 2003) SBME can be used for both formative and summative purposes to provide feedback to students and staff for progression purposes. Departmental or selective implementation of SBME practices can result in ineffectiveness of SBME and continuing medical education (Gregory et al., 2012). Without the concept of the spiral curriculum, EPAs which were introduced during the pandemic, demonstrating no continuity of implementation. Tutors did

not seem to be encouraged to reflect on the design and the alignment before deciding to adopt or change a medical education intervention. For example, in the final year, the use of field operation simulation is encouraged when this special military medicine simulation is required, while in the other year settings, the use of SBME was hardly found to be involved in the developmental milestones and the military medicine which could not represent implementation of SBME and its continuity.

The adaptation of scenarios to current and local need practices covering the activities was considered a priority by the SBME tutors which could increase the compliance with SBME. Gardner et al. (2015) highlighted the importance of acknowledging local needs and engaging stakeholders to increase SBME compliance more effectively than simply adhering to traditional teaching. Within this study, compliance remained with particular groups of tutors. The alignment of evidence with local requirements (e.g., military medicine (officership identity) and national licensing examination (physicianship identity) seemed to have a strong connection with PCM SBME implementation (Tien et al., 2019).

The demonstration of aligned institutional needs evidence with medical education priorities and practice is acknowledged (Brown, 2013; Underman, 2015). The evidence on learning needs enlightens tutors that SBME practices affect learner outcomes and institutional teaching quality. Within this component, procedures for evaluating and monitoring teaching practices (e.g., feedback regarding quality improvement) seemed to have more potential impact on types of SBME implementation than the needs of the current healthcare and medical education situation. The quality assurance processes based on monitoring and feedback do have an effect on assessment according to the national license OSCE examination and on military medicine examination through military medicine-based SBME. In this component, tutors recognized and shared the institutional and programme needs and believed that SBME could offer potential solutions. This is similar to findings of another study applying NPT to understand the successful adoption of new diagnostic technologies in the context of everyday practice (Jones et al., 2016).

Sharing information on student feedback and effectiveness in teaching was used to trigger a reflexive monitoring process (Schiekirka et al., 2012), the process promotes a shift of SBME to collective action reflecting ownership of existing SBME teaching and assessment. As a result of the implemented SBME having its focus on assessment where most of the tutors were not part of SBME designing teams, ownership in PCM setting was found to a lesser extent as tutors had lack of access to their own metrics (e.g., rooms and resources) and contributed to deferred teaching reforms (Law, 2014). Although they did not have an engagement in other metrics, they engaged in using SBME assessment chunks to ensure accurate, proper delivery and the ability to assess the learners. The emergence of ownership for SBME implementation became clear through developing an understanding of the value of SBME and the learning needs to be met in the time of pandemic.

To move SBME beyond the implementation of 'isolated' sessions and 'departmental' implementation, based on the evidence from this component of the study, it is essential to increase the sense of continuity and ownership which represents a critical step towards successful shared responsibility for implementation aligning SBME with the UG medicine curriculum (Bradley & Postlethwaite, 2003). The following are strategies that may be used to promote alignment as achieved in UoD: integration of SBME within other organ systems; and education acknowledging belief and value of spiral SBME. These underlying strategies can contribute to tutors' engagement with implementation. One of the UG medicine elite commented on what went well when PCM tried to increase the use of SBME prior to the pandemic:

> *"Try to encourage tutors to use sim-based learning training in both on- and off-site locations. Actually, before COVID, it was going well." (Int Ref PCM1_15)*

6.5 A Disruptive SBME: Blended SBME and New Emerging Blended SBME

The findings of this component provide an understanding of how the collision of emergent distance learning and a COVID-19 pandemic impact SBME, the elite and expert innovation in

SBME teaching and learning. Tutors have described how their understanding of SBME, blended learning and social distancing have supported their response to the pandemic, and how this has impacted their attitudes to and understanding of transformative innovation of SBME. Taken together these findings suggest that innovative SBME has been advantageous for medical education and a useful vehicle which UG medicine curriculum can be (re)embedded.

6.5.1 COVID-19 and UoD Blended SBME

One of the key aims of the UoD undergraduate curriculum is to promote a competent and reflective practitioner. It is clear in the findings that the UoD SBME tutors changed their SBME pedagogy in response to lockdowns and kept focusing on the achievement of learning outcomes and exit learning outcomes set. Learning outcome construction may be difficult to make as effective as possible for COVID-19 students for whom face-to-face sessions were compromised. Understanding the sense making process is part of the research reflecting what drove positive change in this UoD context.

While it is not possible to characterise a counterfactual scenario in other Scottish medical schools where different approaches were used, these participants have provided knowledge from which students can more positively engage and gain more experiences, and mitigate, the negative impacts from the pandemic.

While SBME constitutes only a small proportion of teaching that the medical school had prioritised to be partly taught on site, the majority had not. Policy makers response to the pandemic in the UK included a series of lockdowns that affected the daily activities of both tutors and students. At the same time, these lockdowns and the social isolation appeared to have rendered SBME pedagogical factors, learning outcomes, face-to-face SBME teaching and learning environment determinants vulnerable. The findings highlight the impact of this for healthcare practice and medical education. The situation that occurred during social isolation appears to have facilitated opportunities for tutors to reflect on their healthcare and medical education systems. One of the findings might suggest this was catalysed by the knowledge of how SBME and wider medical education determinants influence quality of blended SBME.

The literature has explored the impact of the pandemic on medical education and SBME (Kapoor et al., 2021; Williams et al., 2021). Many studies found a reduction in patient encounters and social interactions, reduced face-to-face interaction and increased use of distance learning components during the series of lockdowns. These findings were tempered by a partial increase in blended SBME learning. Clinical teaching has been affected in different ways during lockdown. In many countries, patient visits and admissions have decreased due to changes in COVID-19 healthcare demands and expectation of safety that often resulted in patient care and medical education being surrendered. Despite a reported increase in blended learning, subjective clinical teaching and patient encounters were seen to reduce (Ingrassia et al., 2020; Kraemer et al., 2020). Similar results were found in many settings.

Data on blended approaches represents the ability of social distancing to stimulate pedagogical changes (Cronje, 2021). The ability to transform teaching techniques is reflected by experiences with other university courses, such as changes to the distance mode of learning which occurred during 1990s (Miller & King, 2003). These are important reflections within the context of medical schools. Considering issues in relation to the importance of social interactions in clinical teaching, some responses indicate a requirement to change. However, instead of changing approaches, acknowledgement of the resistance to change has been demonstrated.

Researching through a pandemic provided a lens in which SBME issues are more applicable as is underscored in relation to quality and safety issues. The importance of re-translating SBME concepts into insight is reflected by the increasing importance of blended learning for medical education (Morton et al., 2016). Blended learning can be embedded in medical education and keep pace for students in response to local medical education challenges, allowing them to continue their learning even in a time of crisis.

A shift towards blended learning that is ‘an appropriate use of a mix of methods and technologies to optimize learning in a given context’ (Cronje, 2021) was illustrated by institutes moving to incorporate blended approaches into their existing programs during the pandemic, replacing the social isolation divide between face-to-face and distance learning of the clinical

related or SBME programmes (Majumder et al., 2021; Williams et al., 2021). This trend towards blended learning is also evidenced in SBME curricula. Efforts to incorporate blended learning are supported by SBME pedagogy which describes it as 'constructing learning outcomes.' For this purpose, this study demonstrates that tutors contextualised innovative blended learning within existing spiral curriculum strategies and the material taught during pre-COVID-19 pandemic. Published work has suggested that blended learning teaching is a method to facilitate skills or deliver SBME learning (Vallée et al., 2020). Social distancing education is needed in the time of a pandemic as the circumstances have further exacerbated the need for it. This can be claimed that medical schools retranslate their SBME not only to facilitate constructive learning, but also to accommodate distance learning approaches. The study findings therefore support the innovative idea that blended learning might be a promising approach to deliver COVID-19 SBME.

The study results also suggest that blended SBME learning gained through the pandemic may be enhanced by a distance learning component. There has been previous work on the role of distance learning to enhance SBME (Vallée et al., 2020), and to provide positive effects on knowledge acquisition related to health professions. Moreover, in a study exploring students' perceptions, they expressed a preference for blended learning as a method of facilitating clerkship clinical teaching while maintaining social distancing guidelines (Sukumar et al., 2021). Blended SBME may therefore be a solution of choice, both for its effectiveness in the time of pandemic and one which satisfies students' need.

6.5.2 COVID-19 and PCM Re-Emerging SBME and Blended SBME

PCM SBME remained a minority of teaching that the medical school prioritised to be taught on site while patient contacts were prohibited. Policy makers' response to the pandemic in Thailand included a series of lockdowns, particularly schools and universities, that affected the daily activities of both tutors and students. At the same time, these lockdowns and the social isolation appear to have made practice in clinical settings more vulnerable and resulted in a partial transfer to SBME. The findings highlight that the situation occurring during social

isolation appeared to have facilitated opportunities for tutors to reflect on their healthcare practices and teaching practices. One of the findings might suggest this was catalysed by the changing role and realisation of the value of SBME.

Many studies have found a reduction in patient encounters and social interactions, reduced face-to-face interaction and increased use of distance learning components during the series of Covid lockdowns (Kapoor et al., 2021; Williams et al., 2021). In PCM, clinical teaching was significantly affected during lockdowns. Patient visits and admissions decreased, due to changes in COVID-19 healthcare demands and limitations on face-to-face encounters for safety that often result in patient care and medical education being detrimentally impacted which were found in many settings.(Ingrassia et al., 2020; Kraemer et al., 2020). With specific reference to reduced social interactions, some responses indicated a requirement to change and demonstrated how social distancing stimulated transformative changes (Cronje, 2021).

Researching through a pandemic also provided a lens which showed PCM SBME issues were more applicable as is highlighted in relation to learning opportunities. The importance of this re-translating of SBME concepts into insight is reflected by the increasing importance of both SBME and distance learning for medical education (Morton et al., 2016). The pandemic has demonstrated to PCM tutors that SBME and blended SBME could be valuable as an appropriate replacement for real patient encounters and be additionally embedded in UG medical education as it is able to keep pace with local medical education challenges, allowing learning to continue even in the time of crisis.

A shift towards more SBME learning was illustrated by the institutions move to incorporate blended approaches into the their existing programmes during the pandemic, replacing the social isolation divide between face-to-face and distance learning of clinical related and SBME programs (Majumder et al., 2021; Williams et al., 2021). This trend towards blended learning is also evidenced in the SBME curricula. Efforts to incorporate SBME learning are supported by distance learning pedagogy. For this to occur effectively, this study shows that the tutors contextualised the innovative SBME learning with existing assessment/outcome-based

curriculum strategies and the material taught available during pre-COVID-19 pandemic. There was an adaptation towards given social distancing guidelines used:

> *"For the (surgical) procedures they asked to make a video clip of and hang in a classroom app. We gave the students the equipment to practice. That's pathetic. The students had to come, parked their car, and called in to get their stuff. Our staff would run to them, as they would not allow to get near the hospital. (Int Ref PCM1_5)*

Published literature also suggested that blended learning teaching offers a method to facilitate skills or SBME learning (Vallée et al., 2020). Social distanced SBME education is needed in the time of pandemic, having been accelerated by the pandemic. It can be claimed that PCM tutors retranslated their SBME to promote not only opportunities for clinical learning, but also a distance learning approach to enable them to continue. The study findings support the innovative idea that blended learning might be a promising approach to deliver COVID-19 SBME.

The study results also suggest that innovative SBME and blended SBME gained through the pandemic were enabled by the reduction of social interactions and created positive effects on knowledge acquisition related to health professions. There has been previous work on the role of distance learning to enhance SBME (Vallée et al., 2020). Moreover, in a study exploring students' perception, students expressed a preference for blended learning as a method of facilitating clerkship clinical teaching while maintaining social distancing guidelines (Sukumar et al., 2021). Blended SBME may, therefore, be a solution of choice, for both its effectiveness in the time of pandemic and one which satisfies students' need.

One of the key aims of PCM UG curriculum is to promote competent medicine and military medicine practitioners. It is clear from the findings that although PCM tutors had to change their SBME pedagogy in response to lockdowns, learning outcome assessments through EPAs may be difficult to conduct as SBME implementations that seemed real to COVID-19 medical students for whom face-to-face practice in clinical settings and face-to-face SBME sessions were

vulnerable. As EPA assessments enacted during the pandemic require medical students to demonstrate skills in real clinical settings, when the pandemic subsides and the patient population gets back to normal limits, tutors may select to assess their students in practice rather than in simulated environments. Understanding local contexts and limitations is part of the research reflecting what drives positive change in the SBME context.

6.6 Summary

To summarize the preceding discussion, Table 6.2 captures how different themes or layers relate to the two types of SBME implementation. In the Thai context these constructs of implementation are created and sustained through departmental outcomes, structures and processes whereas in the Scottish system systematic UG spiral curriculum embeddedness takes place. These findings are significant because they expose constructs of SBME implementation, relationships required for different SBME types to be realized, and how transformative innovation and associated processes occurred in response to the pandemic disruption.

There is little evidence to suggest that tutors in the Thai medical school were able to link the change of the healthcare service landscape and the existing curriculum prior to the impact of the pandemic. For example, reduction of patients was not seen and used as a reason for improving teaching and assessment methods. In the Scottish curriculum, this is less of an issue, but the difficulties surrounding the social distancing scheme during the disruption suggests that there is scope for 'stronger' linking through the spiral curriculum, which is crucial for creating curriculum embeddedness. The current situation suggests that in both contexts, the micro and macro scale are interconnected.

Table 6.2: Summary of the Key Aspects to Healthcare and Medical Education to SBME

	UoD	PCM
Healthcare and medical education dimension	Bridging healthcare needs and bonding student progression	Bridging with assessment needs and bonding with departmental and institutional needs
Definite features	Clinical skills centre De-departmentalisation	Simulation centre (temporary) Departmentalisation
Direction of curriculum	Spiral (progressive) outcome-based curriculum	Outcome-based
Types of SBME	Face-to-face SBME	Departmental (Fragmental) face-to-face SBME
Disruptive innovation	Blended version of the existing SBME	Blended and emerging SBME

Source: author

The themes and concepts explored in this chapter have revolved around two frameworks (Figure 6.1 for the Scottish and Figure 6 .2 for the Thai) which illustrate how in each context, various components of the original NPT framework function differently in different timeframe after the transformative innovation is applied.

As a result of healthcare and medical education differences, the ways each of these assets are drawn upon and utilised in teaching and learning are somewhat different. In the Scottish healthcare service, patient exposure is reduced prior to the pandemic. SBME was used to replace and re-connect students with clinical teaching and the wider UK healthcare system. During the pandemic. The Scottish tutors attempts to use SBME largely remained unchanged. In the Thai context, although there is a more departmentalised approach to how the SBME is used, bridging and bonding with patients in healthcare services are drawn upon automatically when medical students are in their clinical years. These medical education assets, which are sufficient in the Thai medical school, enable Thai SBME tutors to support their clinical teaching through real patient encounters, whereas tutors in the Scottish medical school, then, had to use formal and informal structures and processes as means to diffuse and communicate through SBME.

SBME has emerged and re-emerged related to the changing landscape of medical education that applies specifically in the disrupted healthcare context. As a result of reduced patient exposure in real clinical settings in the Scottish medical school, there are stronger relationships and ties between SBME and medical education (teaching and learning). The SBME asset is connected to processes of healthcare and medical education embeddedness. SBME tutors who deliver SBME communicate the linkages between Learning outcome (Task)-Environment (context)-(Learning) Process (person)(TCP) and are adopting SBME strategies unique to replacing real clinical practices. Tutors use these practice and TCP linkages to their teaching advantage, and the usable learning outcomes can be regarded as a form of medical education asset.

The medical education context was first discussed. The different types of learning outcomes in each context were compared. The conceptual labels of exit learning outcomes are applicable to both contexts. In the Thai context, there is tentative evidence to suggest that final year national license OSCE examination and military medicine outcomes associated with exit learning outcomes are related to SBME use. Whereas the learning outcomes, in Scottish context, were used strategically they seek to engage in more systematic progression. Within the Scottish context, de-departmentalisation and spiral curriculum use have both been embedded into this section. Having de-departmentalised the organ system approach in favour of a spiral curriculum enables tutors to engage in integrated SBME activities and spiral curriculum strategies effectively, especially to see students' progression. In the Thai medical school, there is a rigid departmentalised structure, and a rigid national license and military medicine examinations are more likely to act as pressing aspects that determine the needs for SBME prior and in the time of pandemic.

The simulation centre and supports of SBME tutors in the Thai context is far more limited than in its Scottish counterpart. With healthcare and medical education having contextual differences, the implementation is conducted and diffused differently. Investments in in-house SBME teaching and training to develop understanding and retain SBME value is increasingly common, however, limited access to the simulation centre and support in the Thai medical

school is problematic. Healthcare system impacts, from social distancing and social isolation, were found to have an influence on the implementation of SBME. This is clear from both the Scottish and the Thai context, particularly during the pandemic where the reduction of social interactions exposed how important SBME is. Whereas availability of clinical teaching and learning in a real clinical context has been problematic in Western Europe it has not been so challenging in Southeast Asia until recently. This means that healthcare and medical education prior to the pandemics should have been considered for effective SBME implementation.

This suggests that SBME and support is not always underpinned or driven by healthcare and medical education needs that aim to adequately supply broader, integrated UG medicine and clinical teaching as required. Rather, they create opportunities for tutors and students to learn from enacted SBME in a safe and engineered learning environment and may therefore be regarded as 'innovative' forms of integrated teaching as opposed to more 'traditional' forms. The thesis now turns to the final conclusion chapter to draw together the key findings and discuss the main implementation of this research.

Chapter 7: Conclusion

7.1 Introduction

This final chapter demonstrates the key material and novel findings that have emerged from this research. It is structured as a discussion of key findings, study limitations and indicate areas that of future research that might build on the findings or fill gaps identified. In the first section, I briefly recap each chapter drawing out the four main and novel findings. Secondly, a critical and reflective discussion offers conclusions based on the aims and objectives set out at the beginning of the study. Thirdly, limitations of this research are discussed including challenges of researching during the pandemic. This offers possible alternative methodological approaches that, with retrospective reflection, indicate, might have enhanced the findings. Issues of scope and scale are critiqued to locate the research within wider medical education studies.

Finally, opportunities for future research are discussed, which build upon the main findings of this study using the frameworks that have emerged from chapter 3 and 6.

7.2 Recapping the Thesis

The findings of this research expose multiple 'new' and innovative SBME issues and points of discussion that enhance understanding of SBME practice and the discourse on the theory of implementation. Chapter 1, the introduction to the research, outlined the main implementation problems with SBME and the key issues that required attention including the differences of healthcare and medical education landscape. The aims and objectives of this research are founded upon the need for comparative investigation of the application of core concepts of SBME implementation. The cross-contextual, comparative objectives are therefore the first innovative aspect of this thesis.

Chapter 2 contextualised SBME implementation debates and reviewed the key literature on SBME in UG medicine before and in the time of the pandemic. The conceptual perspective was derived through use of Normalisation Process Theory and Transformative Innovation literature and offered two novel theoretical lenses that served to guide subsequent data collection and analyses.

Chapter 3, the methodology, indicated the appropriateness of an approach using an interpretive philosophical epistemology, comparative case study analysis and the consistent application of qualitative data collection techniques, of interviewing and documentary analysis.

Chapters 4 and 5 presented primary evidence from the data collected and undertook an empirical data analysis. Chapter 4 presented the data from a medical school in Scotland while Chapter 5 presented the data from a medical school in Thailand. Chapter 6 incorporated empirical qualitative material but is primarily comparative and conceptual, drawing together the key differences and similarities within the two previous results chapters and linking directly back to the theoretical material of Chapter 2, such as the importance of healthcare service-medical education interactions and contextual trajectories for medical schools with respect to SBME implementation and innovation.

A brief recap of each chapter shows how this research developed. The thesis has therefore created a strong conceptual platform from which a variety of future research themes might be pursued. These future themes are discussed later in the chapter following a more in-depth discussion about the implications of the four key findings and an appraisal of the research aims and objectives.

7.3 Key Findings and Implications

Deconstructing this implementation aspect of the SBME into implementation processes enables NPT constructs, sense making, cognitive participation, collective action and reflexive monitoring to be clearly identified. As a result of the deconstruction of the different implementation processes into four distinctive constructs, the findings have applicability and relevance for future SBME and its implementation debate. There are four novel findings that have emerged from this research. Each has implications for understanding different aspects of SBME implementation.

7.3.1 SBME Structures and Processes of Implementation

The first key finding to emerge from this research is themed in the collected data. Following an exploration of transformative innovation and NPT literature, SBME implementation requires an

understanding to be relevant in the context of healthcare and UG medicine and to meet their needs. This requirement refers to the section of SBME termed implementing and transforming the SBME situated between the healthcare and the medical education assets that tutors, learners or medical education resources have access to, and the subsequent UG curriculum strategies that they are implemented in.

When applying NPT concepts in order to interrogate SBME implementation within the context of UG medicine the framework falls short in the Thai context. This is because SBME is inherently dependent on local healthcare and medical education needs and the implementation choices available in response to deficiencies in UG medicine programmes such as availability of learning opportunities in real clinical settings and the learning outcomes to be met. Investigating these factors with different SBME structures and institutional teaching strategies associated with the existence of educational theory and medical education management allows us to see how the local context can either mask or unmask the value of SBME and influence local UG curriculum strategies. Indeed, the deconstruction of NPT constructs of the two medical schools allowed SBME to be understood/investigated more widely.

7.3.2 UG Medicine Embeddedness and Medical Education Assets

The second finding is an outcome of the SBME structure. Through deconstructing SBME using NPT constructs, the healthcare component, medical education component and SBME processes were able to be located, investigated and critiqued.

As discussed in Chapter 6, the inter-connections between medical education assets and local practice embeddedness are evident in both medical schools, although the ways they relate to one another differ. In the Thai medical school, the availability of practice and learning opportunities in real clinical settings diminishes the perceived value of SBME. The departmental SBME teams were responsible for enhancing SBME delivery, but only to bridge to the learning outcomes that the medical school required students to be assessed against to achieve the exit identified outcomes. Owing to only partial SBME embeddedness and lack of underpinning constructivist educational theory in the Thai medical school, the sessions often fell back to departmental assessment rather than being focused on a broader curricular strategy. The lack

of SBME and education theory embeddedness exposed in the current PCM medical education context in which, as shown in Chapter 6. Figure 6.4 demonstrated SBME extra spaces where medical education developmental milestones and local SBME embeddedness were largely lacking, and why relationships within local healthcare system to the SBME implementation mechanisms and structures were tenuous.

In the Scottish medical school, the layers of bridging medical education across the years and established relationships with local clinical practice were drawn upon. Scottish SBME tutors used both SBME and constructivism embedded in medical school structures as a means to communicate and spread SBME and associated curriculum strategies. As such, the presence of constructivist SBME embeddedness, outcome identification and outcome construction enabled Scottish SBME tutors to deliver their SBME more systematically through their clinical skills centre. In the Scottish context there was greater evidence of SBME embeddedness given that medical schools, such as UoD, give SBME tutors a more active and engaged role in UG curriculum planning. The issue around implementation and transformative innovation frameworks as discussed in Chapter 6 indicated that there is room to develop linking SBME and healthcare practices. This is needed to foster stronger SBME embeddedness across the curriculum in the medical school to (re)create and enable medical schools that streamline exit outcome identification and outcome construction processes to advantage SBME implementation.

7.3.3 Healthcare Needs and Medical Education Outcomes

The third finding related to the notion of local healthcare services and practices as introduced in Chapter 4 and revisited in Chapter 6. In the context of SBME and SBME tutors, learning outcomes can be met through SBME capitalising on various SBME and practice linkages that underpin appropriate SBME construction. This is how differentiation of SBME takes place and how SBME tutors can design a constructive alignment of the SBME curriculum. As has been demonstrated in chapter 4 and 5, these linkages arise and are made possible through understanding of the healthcare need and underpinning educational theory, and these are stronger in areas of more developed curriculum. Indeed, SBME tutors teaching in places of

more developed SBME, such as the UK (particularly Scotland in terms of this study can capitalize on SBME and local medical practice linkages through effective use of clinical skills centre and SBME tutors.

These serve as medical education assets is because, as noted in Chapter 6, they collectively contribute to the preparation of competent and reflective practitioners who serve the needs of a particular community of practice (Scottish Deans' Medical Education Group, 2008). This community of practice reinforces the nature of healthcare service, which only becomes a form of usable medical education asset when tapped into. Tutors in the Scottish medical school have greater access to their medical education assets which facilitate this engagement and implementation process. Assets also include the clinical skills centre and financial resources which enable them to retain more control over the process and capture value through SBME implementation.

This comparative research has revealed the importance of a range of medical education assets, which as captured in Figure 7.1, offer another layer in the processes of achieving SBME embeddedness throughout the curriculum. The Thai medical school, in which practicing in real clinical settings is of benefit, has not had the same SBME development that enables SBME to be more readily available in the same way as occurs in Western Europe. These infrastructural constraints means that the type of demand from Thai medical education places greater emphasis on real patient encounters than on medical simulation. The nature of demand reflects a more 'pragmatic medical education asset' compared with SBME in more developed nations such as the UK.

7.3.4 Transferability of SBME Models from the Western Europe to Southeast Asia

The final novel finding is about the wider applicability and implications that the preceding findings have. In discussing the notion of embeddedness (normalisation), there is a need to question how transferable and relevant SBME models conceived in Western Europe are when re-invented in Southeast Asian countries. This is particularly important when the findings in relation to healthcare and medical education are considered. This is because SBME is arguably more effective in terms of enhancing outcome-based teaching strategies and outcomes of UG

medicine assessment. It is characterised by a more integrated and developed curriculum, where students seek and learn from the SBME that emerges from tutor-made SBME and medical practice linkages. As noted in Chapter 5, the face-to-face SBME model that the Thai medical school follows is founded upon partial or departmental medical education embeddedness (normalisation), value-laden information and SBME-practice linkages for the teaching delivery of SBME which are to some extent overlooked as students have more opportunity to learn in real clinical settings.

This means that the SBME strategy is undervalued in this particular context in terms of having an impact on outcome-based education. It is important to re-state here that the Thai medical school in this study has been envisioned as a hybrid curriculum, between a standardized national licensing examination-based curriculum and an integrated UK outcome-based curriculum. It is therefore understandable why the Thai model does not display the fundamental characteristics of the integrated approach but more the standardized and departmentalised approach as constructed and implemented in the USA.

As discussed in the concluding section of Chapter 6, the Thai medical school could consider pursuing a more pragmatic model that makes use of extensively available SBME to connect students directly with clinical teaching in UG medicine, as well as operating on a more co-operative basis to better meet future healthcare needs and medical education demands. This would help to share medical school capability and demonstrate how to improve resilience when disruptions inevitably arise. Furthermore, after the pandemic occurred, notions of face-to-face SBME, blended SBME and curriculum embeddedness (normalisation) need re-evaluating in the context of Thai medical school, and within the broader contexts of Thailand and Southeast Asia. Moreover, these terms need to be critically appraised when applied in regions that do not align with the same healthcare and medical education contexts and trajectories of the UK and Western Europe.

A final point relates to the need for on-going critical thinking. As with the non-problematic nature of ‘real patient encounter’ integrated clinical teaching in Thailand (Deesaen et al., 2022), SBME may also not need to be understood as a ‘valued’ teaching tool as equally as a loaded

term with positive issues as seen with the Scottish medical school. The thesis now turns to the second section of evaluating the achievement of the stated aims and objectives of the research.

7.4 Revisiting the Aims and Objectives

This research was inspired by various questions and ideas related to the fields of implementation, innovation, and SBME in different contexts, including the role such healthcare systems have in medical education and curriculum design. The comparative, cross-contextual aspect of this study, where Western European and Southeast Asian contexts have been compared and contrasted in tandem rather than in isolation, provided an innovative perspective, as by taking this approach, the implementation and innovation of SBME in context has been explored. This approach enabled both context specific and cross-contextual implementation of SBME to be better understood and to illuminate various micro and macro environments that influence SBME implementation in both Western Europe and Southeast Asia. The research was driven by an overarching aim and three objectives. The extent to which the research aim and objectives were achieved is presented in Table 7.1 and then each aim and objective is discussed to explain how they were met.

Table 7.1: Evaluation of the Achievement of the Aims and Objectives

Aim/Objective	Description of aim and objectives	Result
Aim	To explore transformative innovation of SBME in a systematic SBME user, a Scottish medical school, and a departmental SBME user, a Thai medical school, in association with the COVID-19 pandemic to inform future change in medical education.	Met
Objective 1	To explore SBME practices in a Scottish medical school (Western Europe) and a Thai medical school (Southeast Asia) and how SBME elites/experts implement and innovate their SBME practice in times of the pandemic.	Met
Objective 2	To compare the role of contexts and how innovative SBME contributes to the UG curriculum in the two medical schools studied, as well as to consider the wider implications of the findings from a cross-cultural, comparative case study approach.	Met
Objective 3	To examine the relationships of different micro and macro contexts of medical education and the innovative SBME as well as to develop a framework to inform practical enquiry.	Met

7.4.1 Aim:

To explore transformative innovation of SBME in a systematic SBME user, a Scottish medical school, and a departmental SBME user, a Thai medical school, in association with the COVID-19 pandemic to inform future change in medical education.

The research aim was to provide insights into the implementation of SBME in contrasting contexts of UG medicine, and to explore how they contribute to SBME curriculum and SBME tutors. Using qualitative methods and a case study approach, primary research was successfully conducted with UG SBME in both a Scottish and a Thai medical school. Moreover, multiple

innovative and contributions have been identified through the exploratory nature of this aim. The aims have been achieved as four key findings, previously discussed, have emerged. These related to the healthcare environment, SBME embeddedness (normalisation), local medical practice and specific applicability of SBME to the medical school context.

7.4.2 Objective 1:

To explore SBME practices in a Scottish medical school (Western Europe) and a Thai medical school (Southeast Asia) and how SBME elites/experts implement and innovate their SBME practice in times of the pandemic.

Primary qualitative data collection enabled an in-depth exploration of SBME implementation and innovation in both Thai and Scottish medical schools, and how this enhanced their medical education (curriculum) strategies. The role of healthcare and medical education systems has also been demonstrated through the re-drawn conceptual frameworks in Chapter 6 and medical practice in particular. A focus on healthcare dynamics, medical education relationships and medical practices adopted by SBME tutors became the focus of the research, and this was in the context of innovative SBME as opposed to transformative innovation. However, although this objective refers to innovation, the objective can still be regarded as achieved, given the focus on transformative innovation. The understanding of implementation and innovation within SBME arguably provided the research with a clearer focus.

7.4.3 Objective 2:

To compare the role of contexts and how innovative SBME contributes to the UG curriculum in the two medical schools studied, as well as to consider the wider implications of the findings from a cross-cultural, comparative case study approach.

Chapter 2, the literature review contextualised the key themes and outlined the relationships between the two key concepts of SBME implementation and innovation. These frameworks are both conceptual and practice-based, as they were used as a platform on which to base the case study methodology. Qualitative methods were selected in line with the comparative case study, as this enabled key themes to emerge and be compared from the interviewees and

organisational documents where the research took place. The results are, thus, examined in the data, multi-sources of evidence informed, and the findings from chapter 4 and 5 are revisited in chapter 6.

7.4.4 Objective 3:

To examine the relationships of different micro and macro contexts of medical education and the innovative SBME as well as to develop a framework to inform practical enquiry.

This objective has been fulfilled in Chapters 4-7 and particularly Chapter 6, as this discussion re-visited the theoretical material from Chapter 2. Two of the key findings are about the applicability of SBME models in a particular context and the strength of SBME curriculum embeddedness (normalisation) which directly relates back to this objective. This objective is, thus, the most important in terms of situating research findings within the broader fields of SBME and UG medicine. It has also enabled innovative contributions to be drawn out and for further implications to be identified.

7.5 Limitations of the Research

As with any research project, there are inevitable issues surrounding the validity, representativeness and reliability of results. To understand research limitations, the methodological foundations on which the research was developed needed to be critiqued. As Chapter 3 outlined, this research adopted three methodological components as a means to fulfil the research questions, aims and objectives. These three components were:

1) Comparative case studies
2) Interpretivism
3) Qualitative approach (Interviews and documents)

These three components ensured that the research retained an exploratory focus as defined in the aim. The benefits of this are that the results are grounded within the case study data collected and propositionally compared across the cases, with no pre-conceived judgements that could potentially inhibit the richness of the results. However, the qualitative nature of the

research meant that much of the data was subjectively coded and interpreted. This raised issues in relation to researcher positionality and whether the approach is replicable for other researchers in other contexts. This criticism of qualitative enquiry has been extensively mentioned in qualitative research literature (Bourke, 2014).

The comparative case studies were a significant determinant of the types of results generated. The Thai and Scottish medical schools were selected as case studies not only because they met the criteria associated with SBME, small-scale SBME teaching and representing the Western Europe and Southeast Asia, but also because of logistics and the COVID-19 pandemic. Other countries can and could have been used, but given the logistical challenges of operating in the context of the pandemic, these medical schools were selected. This investigation of smaller units may enrich and deepen conceptual understanding of educational reality between the units compared, but caution needs to be exercised in determining the inherent macro-contextual factors in each country (Manzon, 2014). Different results would almost certainly have emerged in other context, although the conceptual findings in Chapter 3 means that any future research situated at the interface between SBME and UG curriculum has a universal point of implementation.

There is potential for the type of research presented here to adopt an in-depth, case study methodology, spending a period of time in the medical education and healthcare world of participants would enable a deeper knowledge about medical and SBME practices to be gained, and to understand the realities that people face in different contexts. This would be an effective approach, for the researcher, in the Scottish medical school given the 'practically unfamiliar' nature of medical education research field, especially in SBME. Moreover, the case study fieldwork of months (before and during the pandemic) affords greater time to reflect on the research process as it unfolds, and to develop a network of key stakeholders and participants. Similarly in the Thai context, as an insider with a longitudinal relationship helped develop greater depth and greater understanding about each case, and to have on-going dialogues about the issues studied. However, comparing curricula is an on-going process of a complex and dynamic entity and requires multilevel analyses from relevant curricular

manifestations which can be challenged by the subjective nature of interpretation (Adamson & Morris, 2014)

In terms of the strength of this component, it is the only study of which the researcher is aware that explores the relationship between SBME teaching and the COVID-19 pandemic. Among its other strengths, the comparison suggests that a broad understanding of contextual factors was re-considered, although generalisability is potentially limited. A further limitation is that the data were collected in different time frames, and so tutors may have been more likely to give positive biased answers than if they were responding to an independent researcher. The data provides a snapshot of tutors, experience and perception, taken at a time when uncertainty and anxiety may have been unusually high during the social isolation period. This different 'present' links to an individual's perception of cultural and contextual difference within the context of historical time which affects the formation of valid comparisons (Sweeting, 2014).

7.6 Recommendations and Future Research Agenda

Having discussed a variety of issues in relation to SBME implementation, this thesis can contribute to the debate on recommendations and future research issues. The following subsections outline recommendations and a potential future research agenda deriving from the findings of this research.

7.6.1 Recommendations

This thesis has identified two mains areas of recommendations and these are now discussed.

7.6.1.1 Theoretical Recommendations

This research focuses on SBME implementation and innovation processes. There are different characteristics of SBME used in both UoD and PCM. As discussed in Chapter 2, the diversity of SBME used to refer to UG SBME created confusion among UG tutors. This confusion resulted in problems in SBME studies. First, there is a lack of distinctive common ground on which debates and research on the SBME implementation process can be done. Second, there is a lack of attempts at theorisation. Having considered this, the thesis attempts to investigate a variety of

SBME implementation processes from theoretical perspectives and to identify the concept of SBME implementation process in contemporary disruptive contexts.

Based on the conceptual work on implementation processes, the research scope was narrowed down to a focus on SBME implementation processes. As discussed in Chapter 2, the four constructs of NPT expose important factors for an effective implementation strategy highlighting it as a complex process to achieve. It is also concerned with medical landscape change that occurred. This research tackles this issue by combining NPT with TI Framework.

Based on those theoretical discussions, the researcher selected the concepts and innovations related to SBME implementation and developed a conceptual framework to tackle the main research questions:

- How do the contextual factors influence SBME implementation and innovation?
- What SBME implementation and innovation factors are experienced by educators?
- How do implementors in different contexts innovate and what influences do those innovations have on SBME implementation?

The developed framework provides a detailed process model for implementing SBME. This framework stems from two perspectives. First, it attempts to overcome the limitations of existing SBME implementation process models and transformative innovation framework. Second, it proposes an understanding to overcome the lack of value toward SBME in previous Southeast Asian models. Therefore, the framework is believed to enhance the achievement of SBME implementation activities. Moreover, the framework structures and organises various SBME implementation activities in a systematic way to ensure a process to execute the implementation (Figure 7.1).

This study illuminates some of the key benefits of SBME implementation over comparative methodologies. Along with several key concepts of NPT and TI, the researcher proposed the SBME implementation process as being the fundamental concept for making SBME implementation more effective. The framework used for supporting and facilitating the dynamic and heterogenous medical education systems highlights a problem occurred as a

result of the pandemic. It is clear that many different medical education systems focusing on a student-centred approach can be used for SBME implementation in different medical education contexts. However, this research argues that the frameworks bring together the possible required issues to support any SBME implementation process, whereas other non-constructivist approaches would only partially implement SBME.

7.6.1.2 Practical Recommendations

While the thesis mainly aimed at understanding the implementation and innovation process of SBME to tackle medical education problems during the pandemic, it also provided medical schools with practice implications for leaders/tutors development and delivery of implementation and innovation strategies.

As discussed in Chapter 2, SBME has become an essential component of many medical schools seeking to enhance medical students' technical and non-technical skills. However, most of the research on SBME focuses on the non-disruptive aspect of implementation to improve the delivery of SBME. This specific integration of a blended approach to SBME delivery in the developed SBME-NPT framework above can be highlighted as valuable for executing and implementing SBME within a normo-disruptive medical school context where real patient encountering is protected. Previous attempts to deliver new implementations were very broad in terms of providing general guidelines for introducing a new intervention and also lacked an understanding to support the process, which could result in an unstructured, problematic and painstaking process for medical schools.

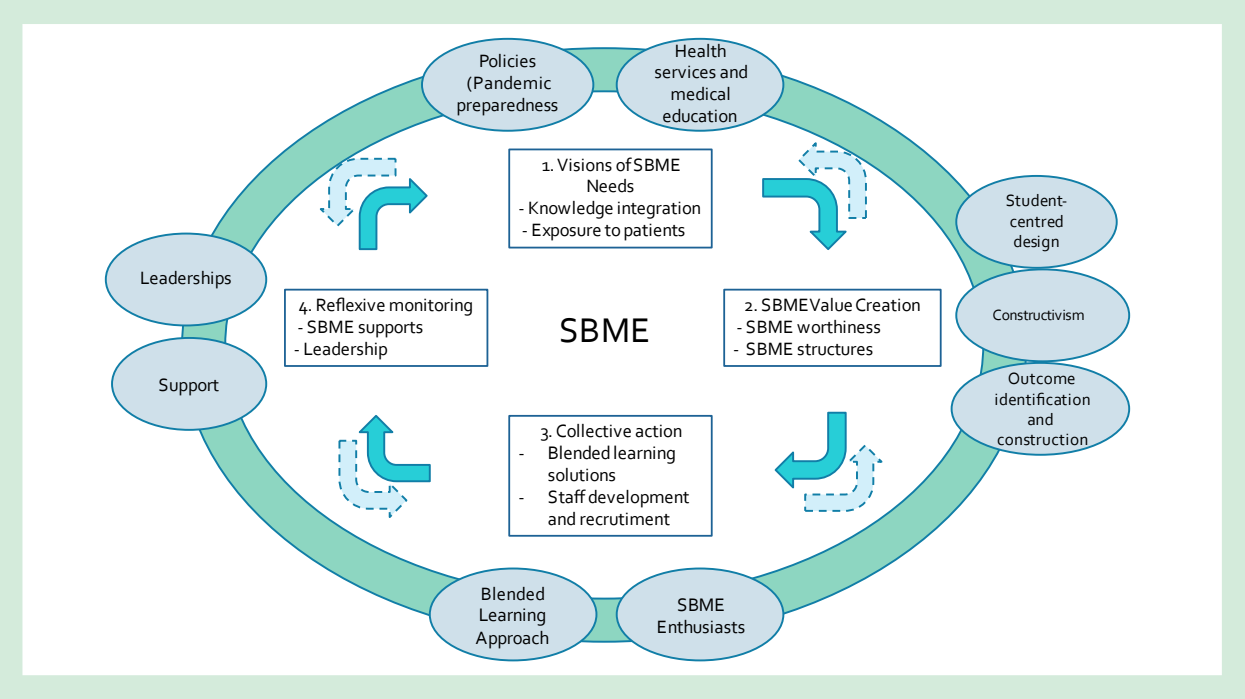


Figure 7.1: SBME Implementation Process with Normalisation Process Theory (SBME-NPT)

The developed framework includes a list of factors for leaders and implementers to execute SBME effectively (e.g., leaderships, healthcare services, SBME values and staff development). As described in Figure 7.1, these factors are extracted from findings and widely accepted literature and are linked with the common implementation process models and transformative innovation framework. By focusing on the implementation process, the SBME implementation can be improved. Moreover, the identification of problems in relation to COVID-19 pandemic functions to support the value of SBME, which were emphasized in the research, led to positive perception towards SBME with specific NPT and TI to support implementation, innovation and resilience of SBME.

The two case studies offer insights for important practical recommendations. The cases can be used as examples or references for medical schools delivering SBME teaching analyses for medical education purposes. Furthermore, the two cases could be used as examples to observe the SBME-NPT framework application in allied healthcare education sectors.

This research, therefore, has practical implications. The most significant finding from this research with regards to a medical school curriculum strategy is that constructivism and the SBME can be well integrated. Through case study illustrations of the SBME-NPT framework, this research has demonstrated the contemporary link between SBME and a constructivist curriculum strategy, which can greatly enhance sustainability of the embedded SBME, even in the time of pandemic.

The SBME-NPT framework provides a new way to execute and implement SBME. Many medical schools use SBME without recognizing its complete process. In fact, medical simulations are used by almost any department and can be used for SBME purposes. This can involve the usage of the SBME-NPT framework. Although the SBME-NPT framework was developed for SBME in the time of disruption, the researcher believes that it also reflects how SBME should be valued and used in similar situations where lack of social interactions is chosen or enforced.

7.6.2 Future Research Agenda

This thesis has identified five broad areas for future research. These are now discussed.

7.6.2.1 SBME Research in UG Medicine

The next step to progress research within the medical schools in terms of their medical education assets is to gain a perspective from tutors who favour traditional teaching and clinical tutors who prefer real patient encounters within the medical schools and hospitals. This was beyond the scope of this research, but it would add another vital layer to the data sources already collected. Moreover, understanding how integrated curriculum and SBME embeddedness are currently mediated between SBME and local healthcare and medical education needs could inform solutions and recommendations about how the process of SBME implementation and normalisation could be strengthened. This is important because understanding how social relations between SBME and practice might be 'shortened' to develop 'stronger' SBME and enhanced UG curriculum is needed (Dieckmann & Ringsted, 2013). In addition, the potential for traditional UG curriculum could be explored. This could

investigate if there is a demand for these types of teaching as opposed to just producing medical graduates.

7.6.2.2 ‘Re-translation’of SBME in the Medical Education

A second potential research agenda is to explore the concept of ‘re-translation’, as articulated by Evans (2014). This is because as noted in Chapter 6, evidence emerged to suggest that some tutors have become intentionally engaged in SBME within the curriculum. Clearly some of this was instrumental, for teaching optimisation reasons, but there was evidence some SBME tutors had simulationised and turning to, or become newly engaged in, SBME practice. For example, some tutors talked of having to use simulators and simulations, suggesting a realisation of the need for more safety and creation of a satisfying changing landscape during the time of pandemic requiring social distancing medical education.

As noted, these could be further substantiated to better understand the reasons driving a shift in SBME and blended learning education, especially given the situation of massive reduction of real patient encounters during the pandemic.

7.6.2.3 Explore the Motivations of SBME Tutors and the Relationship between Practice in Real Settings and Practice in Simulated Scenario

Linked to the previous comment is a need to further understand the types of tutors who engage in SBME and deliver the teaching. This can apply to either Western Europe or Southeast Asia, but investigating the ‘trade-offs’ between teaching optimisation and teaching sufficiency and values would be a useful area in which to develop further knowledge. In particular, investigating the reasons why and how tutors become involved in SBME is needed to understand how to recruit and develop enthusiasts of SBME at local scale. Moreover, research of this nature would assist in understanding contextual factors about healthcare and medical education systems. This would better substantiate real and simulated scenarios applied in this research.

7.6.2.4 The Role of Blended Learning in Re-translating SBME

While the role of blended learning has only been alluded to and touched upon throughout this second half of the thesis, the core concepts lend themselves to exploring alternative online, virtual environments as much as material, 'real' or 'face-to-face' environments. Firstly, processes of SBME embeddedness and face-to-face teaching relations can and are taking place in a blended-distanced learning capacity (Vallée et al., 2020). Indeed, medical educational, experienced SBME tutors are increasingly utilising online learning and interactive virtual patients to connect with learners. The key question raised here is how 'strong' or 'genuine' is trust and the interaction relations that take place from a distance in comparison to the onsite connections that tutors and learners make at the medical school and within the clinical skills centre. It was clear that, during the pandemic, society is increasingly converging on 'distance' and online spaces to share, disseminate and learn, this particular agenda is a timely point of departure to explore notions of blended SBME embeddedness 'beyond' the material realm.

Secondly, as mentioned previously, the role of distance learning for largely disempowered, disconnected or marginalised SBME tutors requires exploration. Indeed, the 'real-time' nature that this technology affords, even in distance locations throughout the developed and developing world, offers potential for tutors, learners and skills learning to have continuous dialogue and be in a stronger position to react to education disruption and demand. As the OECD 'The impact of COVID-19 on education' report alludes: "to remain relevant, universities will need to reinvent their learning environments so that digitalisation expands and complements student-teacher and other relationships" (OECD, 2020, P. 4). This agenda would thus develop some of the key findings about optimising closer, direct relations between tutors and learners.

7.6.2.5 Measuring SBME Embeddedness, Linking Healthcare and Medical Education

This final research agenda refers to some of the key components in the conceptual framework (see Figure 2.5, Figure 6.1 and 6.2). Firstly, the notion of SBME embeddedness (normalisation) needs greater attention, as this has a crucial role in terms of holding other components within

the UG outcome-based curriculum together. In addition, as has been argued, linking healthcare services and medical education is an asset that plays a role in developing integrated curriculum connections and linkages that are needed to support SBME tutors, especially those who are 'newer' to the role.

Given the centrality of linking implementation constructs, formulating some composite measure to gauge how and where it is strong and connecting multiple formal stakeholders and institutions, would add a further layer to this research. This would enable claims about SBME implementation to be tied to medical education theoretical frameworks underpinned by local medical practice. Indeed, this understanding about SBME normalisation is important if SBME is to be an established, contextually appropriate feature of UG medicine landscapes throughout the world.

Furthermore, it must also be noted that this research and these future research agendas are based upon specific types of teaching tools with particular characteristics. Indeed, data collected from the Thai medical school relates exclusively to specific learning outcomes, and the majority of participants in the Scottish medical school were also engaged in some form of UG medicine graduate production. This means that the SBME explored in this research facilitated local medical school needs, which present their own healthcare demands and medical education issues for UG medicine that are absent amongst other postgraduate tutors with sophisticated and specialised medical knowledge. As such, any future research agenda needs to consider the factors and circumstances that are conducive to effective teaching of UG medicine through SBME.

Finally, it is important to consider recent theoretical developments within SBME implementation debates and how they affect future research ideas. For example, incorporating notions of health system science needs into future research agendas will arguably enable a more politicised, transformative and participatory set of agendas to materialise. Moreover, this type of critical, trans-disciplinary approach associated with health system science allows for a clearer focus on issues surrounding medical practice, health systems and community needs, which are becoming an increasingly prominent feature of contemporary medical education

discourse and practice across the globe (Gonzalo et al., 2020). In shifting the conceptual basis from 'patient' more towards these issues around systems, health informatics, quality improvement and systems thinking, the value of research as a transformative instrument for reformation (disruption) becomes ever more apparent (Gonzalo & Ogrinc, 2019).

7.7 Final Remarks

This research has been a journey, not only about unearthing new knowledge and ideas, but a personal journey as a researcher and what it means to do 'good' research. It has become clear how valuable and important stakeholder relationships are in achieving and delivering quality SBME research. Indeed, the on-going, constructive dialogues with elites, experts and participants throughout the data collection, analysis and dissemination phases are important in remaining focused and creating spaces for broader impacts. While this research was designed and delivered with these points in mind, the relatively high dynamics of situations within both medical schools due to uncertainties from the pandemic that this created within the group disrupted the continuity of this 'lower-priority' research project compared with the other everyday responsibilities most of the UG medicine staff had. Moreover, and with particular reference to undergraduate medicine, medical education and healthcare system, the somewhat unforeseen large-scale global disruption during critical stages of data collection meant that maintaining dialogue with influential staff members was challenging. This was also a major factor as to why Scottish interviews and more Thai-oriented interviews failed to materialise during the social distancing period. However, some of the key events described here were beyond the control of the researcher, but the significance of maintaining professional relationships and attaining gatekeeper interest and commitment from the 'beginning' right through to the 'end' of research projects has been emphasised.

Increasingly, it is recognized that there is a need to prepare for enabling creativity and flexibility and to deliver a more innovative educational system and foster new skills amongst educators and learners for future challenges. There is a need for transformative innovation to develop new ways of working that meet the disruptive needs and connect the available collective healthcare and medical education capital. Stakeholders, as steering influencers, must be skilled

to deliver innovative teaching and to create better learning environments. This means future changes and innovative practices must be accepted. However, evidence suggests that innovations are not only necessary but can be rewarding and result in a whole range of benefits to both healthcare and medical education systems.

Resistance or barriers to innovation have been highlighted prior to the disruption, but many of these are and can be perpetual, including the need to solve social distancing problems and deliver effective curriculum strategies. There is room for manoeuvre within the existing healthcare and medical education system. By re-translating SBME and blended SBME, re-professionalising the workforce and empowering tutors, a range of skills and abilities are modelled and at the same time communicated to both tutors and learners. Driving disruptive innovation also requires more imaginative use of available assets and resources including the skills and abilities of learners and steering media used in the field.

A range of tools and techniques that have been used can foster creative thinking, problem solving and innovative practice, and emerging social distancing related solutions presenting new opportunities and medical practices that can lead to more diverse and dynamic learning experiences by harnessing practice and education. A broader medical practice of innovation must be established, so that practice and skills can be shared and suit local contexts and needs, and so that the development of simulation centre can emerge to help with the translation and re-translation of knowledge.

Finally, in situating the research at the SBME-UG medicine curriculum interface over the period of COVID-19 pandemic, rich, innovative material has emerged and both exciting and timely research agendas have been presented. The key now is to fully reflect on the main findings, and to develop knowledge translation and retranslation-focused research agendas. Indeed, it is multi-stakeholder, cross contextual research that enables different layers and levels of understanding to interpret it in the quest to enact positive and more constructive outcomes. It is this retranslation that mirrors the ways in which linking healthcare and SBME embeddedness are mediated in the context of UG medical education systems. Therefore, it makes sense to strive for future research practices that also operate in this way. In doing so, SBME can be

critically explored from a range of medical education systems and perspectives. This means that the ways SBME enhances the UG curriculum is reliant upon stakeholders being better understood.

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Appendices

Appendix 1

Appendix 1a: Impact of COVID-19 on Undergraduate Medicine SBME (Pubmed)

Study ID and author	Institute, country		Time of study	Key finding(s)
1P Steehler et al. (2021)	Department of Surgery, School of Medicine, Emory University (USA)		2020-2021	A virtual format can be effective at providing an educational experience and garnering interest in the field.
2P Salman (2021)	Department of OBGYN, School of Medicine, University of Dundee (UK)		2021	It is clear that there are many opportunities for facilities to integrate simulation-based curriculum, especially for OBGYN undergraduates.
3P De Ponti et al. (2020)	Department of Medicine and Surgery, School of Medicine, University of Insubria (Italy)		2020	During the COVID-19 pandemic, online medical training including simulated clinical scenarios avoided training interruption and the majority of participant students gave a positive response on the perceived quality of this training modality. During this time frame, a non-negligible proportion of students experienced difficulties in online access to this virtual reality platform.

4P Situ-LaCasse et al. (2021)	Department of Emergency Medicine, College of Medicine & Banner University Medical Center – Tucson, University of Arizona (USA)		2021	Ultrasound-naïve medical students can develop basic hands-on skills in image acquisition after reviewing online modules.
5P Kapoor et el. (2021)	Departments of Medicine, People's College of Medical Sciences and Research Centre, Bhopal, Madhya (India)		2021	Simulated patients should be used to supplement day-to-day learning, help in transition to attending real patients and also save enormous faculty time in the post-COVID-19 new normal. However, simulated patients are unlikely to completely replace real patients' experiences.
6P Patel et al. (2021)	University of Toronto, Toronto, Ontario, Canada		2021	The transition to a virtual teaching environment utilizing standardized patients in a pre-clerkship simulation-based curriculum did not result in significant challenges that would limit educators' use of these teaching tools. Implementation of virtual teaching environments with standardized patients may thus serve to address challenges related to COVID-19 and resource limitations.

7P Ingrassia et al. (2020)	Centro Interdipartimentale di Didattica Innovativa e di Simulazione in Medicina e Professioni Sanitarie, SIMNOVA, Università del Piemonte Orientale, Novara, Italy		2020	The planning of future activities (reopening simulation centre) will have to be based not only on safety but also on flexibility principles. Sharing common methods consistent with national and international health guidelines, while taking into account the specific characteristics of the different contexts and centres, will ultimately foster dissemination of good practices.
8P Ngiam et al. (2020)	Centre for Healthcare Simulation, Yong Loo Lin School of Medicine, National University of Singapore, Singapore		2020	Factors that facilitated a rapid and effective response included decisive leadership, open communication, willingness to collaborate, mobilising resources, adaptability and flexibility.
9P Yeung et al. (2022)	Ludwig Boltzmann Institute for Digital Health and Patient Safety, Medical University of Vienna (Austria)		2022	Digital teaching in medical education is expected to flourish in the future, especially during this era of COVID-19 pandemic.
10P Petrica et al. (2021)	University of Medicine and		2021	The video 360 scenarios were effective in teaching EM. In

	Pharmacy, Timisoara, Romania			the long term, employing this accessible and inexpensive educational approach would add value to on-site training by enriching the exposure to a specific ED environment.
11P Behmadi et al. (2020)	Management and Leadership in Medical Education Research Centre, Kerman University of Medical Sciences, Kerman, Iran		2020	VR can effectively improve knowledge in undergraduate emergency student's education, but it was not more effective than traditional educational methods.
12P Wagner-Menghin et al. (2020)	Medical University Vienna, Teaching Center, Vienna, Austria		2020	Developing virtual patients based on three types of clinical activities (interprofessional patient treatment, showing how radiology knowledge improves the diagnosing and treatment of patients) to prepare students for the transition to workplace base learning proved successful and allowed rapid development of learning materials. The presented online quiz format and webinar format showed high acceptance and interest among students.

13P Anne Röhle, Henrike Horneff, Marie-Christin Willemer (2021)	Technische Universität Dresden, Faculty of Medicine Carl Gustav Carus, Medical Interprofessional Training Centre, Dresden, Germany		2021	The Inverted Classroom Model will also be established as an integral part of regular teaching. The findings may be of interest to other Skills Labs to develop concepts for emergency operation teaching to efficiently utilise site-specific resources.
14P Nelia Afonso, Arati Kelekar, Anjali Alangaden (2020)	William Beaumont School of Medicine, Oakland University (USA)		2020	This virtual instruction method is an effective tool for teaching basic clinical skills during medical school. Virtual learning resources allow remote instruction to take place and can be a supplement when face-to-face clinical teaching is not possible.
15P Chadha et al. (2021)	Eye and Ear, Eye and Vision Research Institute, Icahn School of Medicine at Mount Sinai/New York (USA)		2021	Virtual clinical reasoning case simulated small- and large-group learning, achieved knowledge gains, and was well received by students. Minor technical challenges were encountered but successfully remedied, without apparent disruption to learning. This virtual medical education model can be used to enhance ophthalmology education in preclinical medical students and can

				be adapted for virtual design of other curricular content.
16P Chua et al. (2021)	Centre for Nursing Studies, National University of Singapore (Singapore)		2021	The use of virtual telesimulation played acritical role in facilitating the application of mental models for learning transfer and therefore could serveas a promising education modality for sepsis training.
17P Sukumar et al. (2021)	School of Medicine, University of California, San Francisco (USA)		2021	VR allowed students to practice rounding skills in a supportive team-based setting. The lessons learned from its implementation could facilitate education during future pandemics and could also supplement in-person clerkship education.
18P Ray et al. (2021)	Department of Emergency Medicine, Yale School of Medicine, New Haven, Connecticut (USA)		2021	Communication patterns within the virtual telesimulation format required more deliberate turn-taking than normal conversation. Using the chat function within the videoconferencing platform allowed teams to complete simultaneous tasks.
19P Williams et al. (2020)	Perelman School of Medicine, University of Pennsylvania (USA)		2020	Virtual medical student rotations are scalable and effective at delivering surgical material and can approximate the interpersonal teaching found in clinical learning environments. They may be a useful tool to supplement or

				augment clinical learning in select situations.
20P Dhar et al. (2021)	Institute for Innovation in Mental and Physical Health and Clinical Translation, School of Medicine, Faculty of Health, Deakin University, Geelong (Australia)		2021	AR can enhance the experiences of medical students, by improving knowledge and understanding, practical skills and social skills. These concepts are discussed within the context of specific AR medical training programs, such as HoloHuman, OculAR SIM, and HoloPatient.
21P Majumder et al. (2021)	Faculty of Medical Sciences, The University of the West Indies, Cave Hill Campus, Cave Hill (Barbados)		2021	Online teaching platforms have virtually replaced didactic face-to-face lectures. Radiology educators also sought other strategies to incorporate interactive teaching sessions while adopting the e-learning approach, as they were cognizant of the limitations that this may have on students' clinical expertise. Migration to online methods to review live cases, journal clubs, simulation-based training, clinical interaction, and radiology examination protocolling are a few examples of successfully addressing the limitations in reduced clinical exposure.

22P Costabile (2020)	University of South Australia and SA Pathology, Adelaide, South Australia (Australia)			Simulations and online approaches used proved to be highly effective and can be readily adapted not only to teaching Biochemistry, but any aspect of science education.

Appendix 1b: Impact of COVID-19 on Undergraduate Medicine SBME (EMBASE)

Study ID and author	Institute, country	Time of study	Key finding(s)
1E Hjiej et al. (2022)	Faculty of Medicine and Pharmacy of Oujda, Mohammed Premier University, Oujda, Morocco	2022	Distance Education needs to include more interactive activities and more multimedia studying resources to engage students more efficiently in their self-regulated learning.
2E Tuma et al. (2021)	General Surgery Department, Central Michigan University College of Medicine	2021	There is urgent and challenging need for surgical training using additional alternative curriculum objects (components). Working with the available resources and experiences is crucial to maximize the learning outcomes. Distance (online) education and educational technology tools and concepts provide a spectrum of valuable educational activities.
3E Hyunmi Park, Sunhee Shima, Young-Mee Lee (2021)	Department of Medical Education, Korea University College of Medicine, Seoul, (Republic of Korea)	2021	Almost all elements of clinical teaching were deliverable, whether it was online, onsite, virtual or blended, their educational effectiveness should be further examined. Increase in the number of telemedicine related publications were remarkable, and they could serve as a scalable model for future educational programs to be incorporated into the medical student curricula.

4E Luu et al. (2021)	Perelman School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania (USA)	2021	Online videos of neck dissection represent an increasingly ubiquitous and appropriate resource for trainees in learning otolaryngology key indicator cases. While free-to-access video repositories, such as YouTube, have become increasingly popular among trainees as a primary resource for learning and preparing for surgical cases, they lack consistent quality and as such, global efforts should be taken to improve the breadth and depth of educational video content in otolaryngology.
5E Prabhath et al. (2021)	Department of Anatomy, Kasturba Medical College Manipal, Manipal Academy of Higher Education, Manipal, (India)	2021	There should be a balance between synchronous and asynchronous teaching methods to provide a better learning pace. Incorporation of more self-directed learning strategies would motivate students to learn better. The study concludes that online teaching should be designed to keep student feedback in mind, and tailored to suit student learning needs.
6E Amin Gasmia, Rachid	Societe Francophone de Nutritherapie et de Nutrigenetique Appliquee, Villeurbanne (France)	2022	AR/VRs are found obtainable. Its uses in maintaining social distancing, monitoring/controlling COVID-19 virus, and other unique technologies similar to

Benlamri (2022)			AR/VR that will help mitigate COVID-19 cases.
7E Currie et al. (2020)	Charles Sturt University, Wagga Wagga, NSW (Australia)	2020	Technology has allowed rapid assimilation to online learning environments with additional benefits that allow flexible, mobile, agile, sustainable, culturally safe and equitable learning focussed educational environments in the post-COVID-19 ‘‘new normal’’.
8E Chao et al. (2020)	Department of Otorhinolaryngology - Head & Neck Surgery, University of Pennsylvania, Philadelphia, Pennsylvania (USA)	2020	Use of such innovative technologies for education may not only be applicable to COVID related undergraduate medical education limitations, but also may be expanded for use wherever demonstrative methods of teaching are necessary for medical education.
9E Sindiani et al. (2020)	Department of Obstetrics and Gynecology, Faculty of Medicine, Jordan University of Science and Technology, Irbid (Jordan)	2020	Most medical students at ‘the medical school’ preferred the traditional face-to-face teaching method over the solo online teaching methods with recommendations to convert to a more integrated educational system. Also, a well established infrastructure should be done in involving online teaching.
10E Zackoff et al. (2020)	Department of Pediatrics, University of	2020	VR can be used to establish objective and observable performance standards for assessment of EPA attainment − a key

	Cincinnati College of Medicine (USA)		step in moving towards competency based medical education.
11E Bußenius et al. (2021)	Department of Biochemistry and Molecular Cell Biology, University Medical Center Hamburg-Eppendorf, Hamburg (Germany)	2021	The global rating is a suitable instrument for video-based rating of communication skills
12E Taylor et al. (2022)	GKT School of Medical Education, Kings College London, Great Maze Pond, London SE1 1UL (United Kingdom)	2022	VR is a popular choice with undergraduates as an aid to supplement teaching, in spite of the associated cost and side effects such as nausea. AR has shown the most potential for independent study. Larger and long-term studies are required to determine true effectiveness, and consideration of the clinical relevance of these technologies.
13E Mitchell Pfennig, Andrew Lee, Misa Mi (2022)	Department of Foundational Medical Studies, Oakland University William Beaumont School of Medicine (USA)	2022	The use of telementoring has proven numerous benefits towards the development of surgeons. Telementoring can be used to increase access to geographically isolated areas while providing adequate surgical training and education
14E Giordano, Lorenzo	Department of Musculoskeletal Disorders, Faculty of	2021	The massive use of internet platforms, a wise distribution of work shifts, and others, universities and hospitals have

Cipollaro, Lucio Migliorini, Filippo Maffulli, Nicola	Medicine and Surgery, University of Salerno, Salerno, Italy		not only reduced the impact on the learning process of resident and students but also turn this pandemic into a moment of personal and professional growth for the new generation of healthcare professionals.
15E Al-Jabir et al. (2020)	GKT School of Medical Education, King's College London, United Kingdom	2020	Elective and non-urgent surgery cancellations have enabled surgeons to become a critical staff resource for the health systems to treat the COVID-19 pandemic. Surgeons are considering safe non-surgical alternative options to treat their patients during COVID-19.
16E McGann et al. (2020)	University of Rochester Medical Center, 601 Elmwood Avenue, Rochester, NY	2020	These innovative online surgical skills elective improved undergraduate medical student confidence, knowledge, and skillset with surgical instrument identification, knot tying, and suturing while also facilitating effective expert feedback on individual performance.
17E Bosveld et al. (2021)	Faculty of Health, Medicine and Life Sciences Maastricht University Medical Centre+ and Maastricht University, Maastricht (the Netherlands)	2021	Medical students' and specialists' experiences during the first peak of COVID-19 underscore the preliminary suggestion that students can be given more enhanced (yet supervised) responsibility for patient care early in their practicums.

18E Marotta et al. (2022)	Department of Neurological Surgery, Indiana University, Indianapolis, Indiana (USA)	2022	Neurosurgical education has taken to the internet, partly as a means of circumventing barriers to in-person education posed by the global COVID-19 pandemic. Although virtual educational content has significantly increased in frequency, the literature lacks a standardized survey for evaluating relative content utility, presentation, and saliency.
19E Hilburg et al. (2020)	Renal Electrolyte and Hypertension Division, Perelman School of Medicine at the University of Pennsylvania, Philadelphia (USA)	2020	Adherence to social distancing has led to the adoption and implementation of already available technologies in medical education, including video conferencing softwares and social media platforms. Efficient and effective use of these technologies requires an understanding not only of these platforms and their features but also of their inherent limitations. During a time of uncertainty and increased clinical demands, the approach to medical education must be thoughtful with attention to wellness of both the educator and learner.
20E Solotke et al. (2022)	Department of Obstetrics and Gynecology, Northwestern University Feinberg School of	2022	A multipronged evaluation showed that a new pediatric adolescent gynecology clinical rotation significantly increased medical students' clinical skills and knowledge. This multifaceted evaluation

	Medicine, Chicago, Illinois		method provides valuable insights to educators on how best to tailor a rotation to individual learners' levels of clinical skills and knowledge.
21E Pannullo et al. (2022)	Department of Neurological Surgery, Weill Cornell Medical College, New York, New York (USA)	2022	Longitudinal exposure to neurosurgery throughout medical school helps ensure a foundational understanding of neurosurgical disease management for all physicians and provides a pathway of exploration, education, and mentorship for the most suitable candidates. Neurosurgery faculty mentorship is particularly important to ensure that the next generation of neurologic surgeons are well equipped to treat patients, catalyze innovative research, and espouse both diverse perspectives and novel ideas.
22E Menon et al. (2021)	Amrita Institute of Medical Sciences and Research Centre, Amrita Vishwavidyapeetham, Kochi, Kerala (India)	2021	On a scale scoring for satisfaction, 53.6% scored moderate, 31% high, and 15.4% low satisfaction. 49.8% of the students were less satisfied about attending classes from home; 15.7% felt it was better. 57.1% of the students found the concept of online learning moderately useful, 31.4% found it minimally useful, 11.5%, highly useful.

23E Chen et al. (2021)	Department of Radiology, University of Kentucky College of Medicine, Lexington, Kentucky (USA)	2021	Radiology teaching needs to adapt to the constantly evolving digital era through the usage of microlearning and innovative tablet apps and tools. These learning and teaching strategies are not new but accentuated due to safety concerns of COVID-19 pandemic.
24E Feeley et al. (2022)	Midlands Regional Hospital Tullamore, Co. Offaly, Ireland	2022	The pandemic posed challenges to adequate student-patient exposure. Delivering surgical bedside teaching remotely is a method amenable to learning for students, with advantages including convenience, fewer reports of information fatigue, and decreased perceived pressure identified with this learning modality.
25E Pang et al. (2021)	Department of Surgery, UNM School of Medicine, MSC10 5610, 1 University of New Mexico (USA)	2021	virtual module of communication skills training, using standardized patients and faculty, improved students' belief in their self-efficacy in obtaining informed consent. This communication module can be useful in a virtual or mixed curricular structure for both current and future medical students.
26E Jessica Macwilliam,	Alder Hey Children's Hospital, Liverpool, UK.	2021	Due to the increase in the use of telemedicine it is important that clinicians develop effective consultation practices including appropriate selection of

Iain Hennessey, Gavin Cleary			patients, technical setup and consultation tools. In order to ensure trainees are developing appropriate skills in telemedicine, educational opportunities should be developed including structured assessment tools to allow the demonstration of competence in this area.
27E Kortz et al. (2022)	Department of Neurosurgery, University of Colorado Anschutz Medical Campus, Aurora, Colorado (USA)	2022	Medical Student Neurosurgery Training Center resources appear to have promising preliminary benefits for students. Increasing medical student awareness, continued development of these resources, and objectively assessing outcomes in neurosurgery education are warranted.

Appendix 2

Appendix 2a: Documentation Analysis Guide (UoD Phase 1)

Document analysis guide Date collected……..

Documentation analysis guide:

Project: Translating the medical simulation approach from the Scottish to the Thai medical education system: An analysis of implementation

Background

The documentation analysis is planned to be used to inform how the Simulation Based Education (SBE) integrated into the existing curriculum which may depend the SBE approach. Its role in supporting other methods is to explore the policy intention, policy action and resources curriculum of the existing SBE approach.

Purpose

The purpose of this documentation analysis is to describe the formal curriculum of SBME and demonstrate the pedagogical and planning system underpinning the curriculum

Checklists and questions

1. Type of Document ……
2. Characteristics of the document ……
3. Date of the document ……
4. Author of the document/responsible for content ……..
5. For what audience was the document written? .....
6. Document information

6.1 For SBME Policy intentions

- What are the main topics of the document?
- Who is the target group of the content, described in the document?
- Is there any specific form of SBME as well as SBME implementation mentioned in the document?
- Who is addressed, in connection with SBME/ SBME implementation?
- Is there a special focus on SBME in undergraduate students (communication)?
- Which methods of SBME implementation are described?
- Are there any other categories of SBME mentioned in the document?

6.2 For SBME policy actions

- What information will be given to students about?
- How will the activity be implemented?
- How will the participants be behaving?
- How will the participants be interacting?
- What will the evidence be seen that students have achieved expected learning outcomes?

1

Document analysis guide Date collected……..

6.3 For an SBME resourced curriculum

- How will the resource be?
- Will it appear to be of good quality (visual, sound, contents, structure of contents)?
- How will students be introduced to the resource (verbal information, written information, demonstration, training etc)?
- What information will be given to students about?
- How will the students use it?

Appendix 2b: Documentation Analysis Guide (UoD Phase 2)

Documentation analysis guide

Project:

"Transformation of simulation based medical education pedagogy in the time of the COVID-19 pandemic: A case study analysis of undergraduate medical education"

Background

The documentary analysis aims to inform how Simulation Based Medical Education (SBME) governance has been transformed during the COVID-19 pandemic. Its role in supporting other data collection methods is to explore the pedagogical change and the interplay of ideology, epistemology and pedagogy.

Purpose

The purpose of this documentary analysis is to describe the emerging landscape of SBME pedagogy and demonstrate the policies underpinning the modification of the curriculum during COVID-19 pandemic.

Checklists and probes

1. Type of Document ..... Code No.....
2. Primary purpose of the document .....
3. Date of the document .....
4. Author of the document/responsible for content .....
5. For what audience was the document written? .....
6. Document information

Practice

- Change in SBME pedagogy:
  Probe in relation to impacts of COVID-19 on the SBME teaching
  - impacts from COVID-19
  - practical approaches (staff, student, physical spaces used, operations and management challenges)
  - an example of SBME teaching innovations
  - challenges and support needs
  - the quality of teaching and assessment of learning
  - the students' progress and competency required
- Change in epistemology
  Probe in relation to impacts of COVID-19 on the nature of SBME
  - the new SBME landscape
  - the role and value of SBME
  - the delivery of SBME teaching
  - Influencing factors (the culture, organizational system and developmental stages within which educators operate)

- Explore their SBME ideology
  Probe in relation to impacts of COVID-19 on the nature of UG medicine
  - changes in nature of UG from the impacts of COVID-19

Policies

- Policies and support needs
  Probe in relation to SBME context
  - influence of international, national, institution, department, colleagues and community of practice.
  - the factors that inhibit the delivery of SBME innovations
  - the other circumstances (context elements) that are the most important in facilitating the effective SBME teaching
- Vision:
  - Does it address plans for future SBME?
  - How are they going to do these things in the coming year?

Principles

- Explore principle changes
  - Does it address the fundamental change of SBME due to COVID-19?
  - How SBME might be redefined? How SBME might be assessed? Can you describe these?

Appendix 2c: Documentation Analysis Guide (PCM)

Document analysis guide
Document No.....

Date collected.....
Version 1, 2nd December 2021

Documentation analysis guide:

Project: Simulation Based Medical Education in Scottish and Thai Medical School at pre and during the time of COVID-19: a Comparative Study (Part: 2 a Case Study of the Thai Medical School)

Background

The documentation analysis is planned to be used to inform how the Simulation Based Medical Education (SBME) innovated in the existing curriculum which may depend the SBME approach. Its role in supporting other methods is to explore the SBME policy intentions, SBME policy actions and resourced curriculum of the existing SBME approach.

Purpose

The purpose of this documentation analysis is to describe the formal curriculum of SBME and demonstrate the pedagogical and planning system underpinning the curriculum

Checklists and questions

1. Type of Document .....
2. Characteristics of the document .....
3. Date of the document .....
4. Author of the document/responsible for content .....
5. For what audience was the document written? .....
6. Document information

6.1 For SBME Policy intentions

- What are the main topics of the document?
- Who is the target group of the content, described in the document?
- Is there any specific form of SBME as well as SBME implementation mentioned in the document?
- Who is addressed, in connection with SBME/ SBME implementation?
- Is there a special focus on SBME in undergraduate students (communication)?
- Which methods of SBME implementation are described?
- Are there any other categories of SBME mentioned in the document?

6.2 For SBME policy actions

- What information will be given to students about?
- How will the activity be implemented?
- How will the participants be behaving?
- How will the participants be interacting?
- What will the evidence be seen that students have achieved expected learning outcomes?

6.3 For SBME resourced curriculum

- How will the resource be?
- Will it appear to be of good quality (visual, sound, contents, structure of contents)?
- How will students be introduced to the resource (verbal information, written information, demonstration, training etc.)?
- What information will be given to students about?
- How will the students use it?

1

Appendix 3

Appendix 3a: Interview Guide (UoD phase 1)

Elite interview guide Date collected……..

Elite interview Guide:

Project: Translating the medical simulation approach from the Scottish to the Thai medical education system: An analysis of implementation

Background

The interview is designed to gather information to inform how Simulation Based Education (SBE) is implemented in the existing curriculum. Its role in supporting other methods is to explore the policy intention, policy implementation, resources curriculum and implemented curriculum. The participants will be given brief information on the initial project idea from the information sheet already available (e.g. written project design) which may be helpful for reference immediately prior to and during the interview.

Purpose

The purpose of this interview is to explore:

- What was the original policy intention and how the SBE was undertaken?
- What have been the main policy actions? (teaching material, lesson plans, assessment materials, meetings, notice)
- What can be seen in terms of implemented curriculum? (Interactions, roles of trainers and students)
- What has been learnt about how the SBE approach taken is influencing the outcomes/impact that is being experienced by staff or students, or others with an interest in the project

Housekeeping checklist

- Introductions and thanks for participation
- Explain to interviewee:
  - the purpose of the interview
  - intended recipients of findings and how they will be used
  - format of the interview
  - the amount of time the interview is anticipated to take
- Seek consent to record, transcribe and circulate data provided by the interviewee to intended recipients.
- Answer any questions the interviewee may have with regard to this evaluation activity.

1

Elite interview guide Date collected……..

Interview guide

Participant being interviewed:

Age

Gender

Position

Questions

1. Could you tell me a little about how the idea came about for this SBE approach?
2. Could you tell me about the implementation and the evolution of the SBE while you were undertaking it?
3. How did you undertake the SBE in the end?
4. To what extent do you think the educational aims of SBE approach have been achieved?
5. What were the supports from the medical schools and your colleagues to implement this SBE? (training for trainer, teaching materials, assessment material?)
6. Are there any issues that will affect your ability to implement the approach (with these improvements) in the future?
7. What do you think you have learnt from undertaking this SBE approach?

[Prompts: About the learning and teaching approach, personal development/skills, transferable learning, Factors that might affect transferability]

8. Were there any unexpected outcomes from the SBE? What were these? What do you think influenced them?
9. Are there any other factors you think have had a positive or negative effect on the implementation of the SBE?

[Explore here project management issues – i.e. those not necessarily related to immediate learning and teaching context e.g. Amount/availability of financial or other resources, departmental management support, collaboration with staff (own dept or in another dept), clarity of roles, relationships, responsibilities of those involved, decision making, communication]

Housekeeping checklist - end of interview

- Thank the interviewee for their time.
- Remind the interviewee of consent and confidentiality issues.
- Check whether the interviewee wishes to withdraw any information provided in the interview from being shared with the intended recipients of a report.
- Check whether the interviewee wishes to see transcript and make changes (if one is planned).

Appendix 3b: Interview Guide (UoD phase 2)

Interview Guide

Project: "Transformation of simulation based medical education pedagogy in the time of the COVID-19 pandemic: A case study analysis of undergraduate medical education"

Background

The interview is designed to gather information to inform how Simulation Based Medical Education (SBME) is changing in the current COVID-19 pandemic. Its role involves seeking a deeper understanding of SBME teaching changes and innovations in response to the impacts and consequences of COVID-19 pandemic that might inform an emerging pedagogical transition. Participants will be provided with brief information on the initial project idea from the information sheet already available (i.e., written project design) which may be helpful for reference immediately prior to and during the interview.

Housekeeping checklist

- Introductions and thanks for participation
- Explain to interviewee:
  - the purpose of the interview
  - intended recipients of findings and how they will be used
  - format of the interview
  - the amount of time the interview is anticipated to take
- Seek consent to record, transcribe and circulate data provided by the interviewee to intended recipients.
- Answer any questions the interviewee may have with regard to this evaluation activity.

Interview guide

Participant being interviewed: Code No.....

In this interview I would like to explore how the COVID-19 pandemic has impacted on SBME practices, policies and principles.

- information about yourself, including your current role and the responsibilities that you have for supporting SBME?

Practice

- Changes in SBME pedagogy
  Probe in relation to impacts of COVID-19 on the SBME teaching
  - Practical approaches from the pre-COVID-19 (staff, student, physical spaces used, operations and management challenges)
  - An example of your SBME teaching innovations
  - Support needs
  - Quality of teaching and assessment of students
  - Students' progress and competency required
- Changes in SBME epistemology
  Probe in relation to impacts of COVID-19 on the nature of SBME
  - the significance/new SBME landscape
  - the role and value of SBME
  - the delivery of SBME teaching

- Influencing factors (the culture, organizational system and developmental stages within which educators operate)?

- Explore their SBME ideology

  Probe in relation to impacts of COVID-19 on the nature of UG medicine
  - UG and SBME changes from the impacts of COVID-19

Policies

- Policies and support needs

  Probe in relation to SBME context
  - influence of international, national, institution, department, colleagues and community of practice (key policy related documents).

    (How do you see the above policies mentioned informed or supported needs for appropriate SBME teaching?)
  - the factors that inhibit the delivery of SBME innovations
  - the other circumstances (context elements) that are the most important in facilitating the effective SBME teaching

- Vision:
  - If the second wave come, how do you envision SBME would be?
  - Do you have plans for SBME?
  - How are we going to do these things in the coming year?

Principles

- Probe: changes in principles
  - Will SBME look fundamentally change from the pre-COVID?
  - How SBME might be redefined? How SBME might be assessed? Can you describe these?

Housekeeping checklist - end of interview

- Thank the interviewee for their time.
- Remind the interviewee of consent and confidentiality issues.
- Check whether the interviewee wishes to withdraw any information provided in the interview from being shared with the intended recipients of a report.
- Check whether the interviewee wishes to see transcript and make changes (if one is planned).

Elite/Expert interview Guide:

Project: Simulation Based Medical Education in Scottish and Thai Medical School at pre and during the time of COVID-19: A Comparative Study (Part 2: A Case Study of the Thai Medical School)

Background

The interview is designed to gather information to inform how Simulation Based Medical Education (SBME) is innovated in the existing curriculum over the period of COVID-19 pandemic. Its role involves seeking to determine the SBME implementation process of the Thai medical school approach and define the logical model of the implementation and innovation. The participants will be given brief information on the initial project idea from the information sheet already available (e.g. written project design) which may be helpful for reference immediately prior to and during the interview.

Housekeeping checklist

- Introductions and thanks for participation
- Explain to interviewee:
  - the purpose of the interview
  - intended recipients of findings and how they will be used
  - format of the interview
  - the amount of time the interview is anticipated to take
- Seek consent to record, transcribe and circulate data provided by the interviewee to intended recipients.
- Answer any questions the interviewee may have with regard to this evaluation activity.

Elite/expert interview guide
Participant No.....

Date collected.....
Version 1, 2nd December 2021

Interview guide

Participant being interviewed:

Please tell me about yourself and your experiences in SBME innovations:

Questions

- Can you please tell me about the SBME situation in the medical school prior to the COVID-19?
  - What was/were the SBME(s) used in the medical school?
  - What were the management processes/coordination mechanism?
- Can you tell me what happened to the SBME during the pandemic?
  - What was the design or plan? Was it appropriate to local needs?
  - What was the intention behind the innovation of SBME?
  - How did the changes implement?
  - What were the enablers and barriers during the innovation of the SBME?
- How did the change influence people thinking/acting on this issue?
  - What were the immediate/intermediate/later outcomes of the change?
  - What were the intended and unintended outcomes of the change?
- How did you evaluate the change? Institutionalisation? Human resources?
- Recommendations/considerations for applying in other contexts?

Housekeeping checklist - end of interview

- Thank the interviewee for their time.
- Remind the interviewee of consent and confidentiality issues (signifier).
- Check whether the interviewee wishes to withdraw any information provided in the interview from being shared with the intended recipients of a report.
- Check whether the interviewee wishes to see transcript and make changes (if one is planned).

แบบสัมภาษณ์ (Interview Guide)

การศึกษาเปรียบเทียบการเรียนการสอนแบบซิมมูเลชั่นของหลักสูตรแพทยศาสตรบัณฑิต มหาวิทยาลัยดันดี และวิทยาลัยแพทยศาสตร์พระมงกุฎเกล้า ในห้วงวิกฤติโควิด 19 (ส่วนที่ 2 กรณีศึกษาวิทยาลัยแพทยศาสตร์พระมงกุฎเกล้า

Simulation Based Medical Education in Scottish and Thai Medical School at pre and during the time of COVID-19: A Comparative Study (Part 2: A Case Study of the Thai Medical School)

แบบสัมภาษณ์

แบบสัมภาษณ์นี้จัดทำขึ้น เพื่อศึกษาและทำความเข้าใจการนำสถานการณ์จำลองทางการแพทย์ไปใช้ และนวัตกรรมในห้วงการระบาดเข้าไปอยู่ในหลักสูตร โดยข้อมูลจากการสัมภาษณ์จะถูกนำไปใช้ในการวิเคราะห์แนวคิด นโนทัศน์ของผู้เข้าร่วมวิจัย

วันที่ทำการเก็บข้อมูล .....

อาสาสมัครเข้าร่วมงานวิจัย รหัสเลขที่.....

ตำแหน่ง รหัสเลขที่..... หน้าที่ รหัสเลขที่.....

บทบาทกับสถานการณ์จำลองทางการแพทย์ รหัสเลขที่.....

แบบสัมภาษณ์

ส่วนที่ 1 นี้ ผู้วิจัยต้องการให้ท่านร่วมสะท้อนประสบการณ์ จากการที่ท่านอยู่ในระบบการทำงานของ วพม. เรื่องของการนำเอาวิธีการสอนใหม่ เช่น การสร้างสถานการณ์จำลองทางการแพทย์มาใช้ในห้วงก่อนเกิดการระบาดของไวรัสโควิด19 โดยมีคำถามกึ่งโครงสร้างดังนี้

- ท่านมีความเห็นอย่างไรต่อการนำ/รับเอาวิธีการสอนรูปแบบใหม่ๆมาใช้
- ท่านมีความเห็นอย่างไรต่อการนำการสร้างสถานการณ์จำลองทางการแพทย์ (Simulation Based Medical Education) มาใช้ในหลักสูตร

ส่วนที่ 2 นี้ ผู้วิจัยต้องการมุมมองต่อวิธีการนำสถานการณ์จำลองทางการแพทย์มาใช้ในการเรียนการสอนในห้วงการระบาดของโควิด 19 โดยทำการเปรียบเทียบกับประสบการณ์ใน วพม.

- ท่านคิดว่าประสบการณ์ หรือวิธีการใช้สถานการณ์จำลองทางการแพทย์ในช่วงการระบาดของโควิด เป็นอย่างไร ทำให้เกิดนวัตกรรมใหม่ๆอย่างไร

ส่วนที่ 3 นี้ ผู้วิจัยต้องการทราบ แนวทางหรือปัจจัยที่ส่งผลต่อการเกิดขึ้นของนวัตกรรมและการใช้สถานการณ์จำลองทางการแพทย์ในห้วงดังกล่าว

- ท่านคิดว่าจะต้องมีปัจจัยอะไรบ้าง ที่จะช่วยให้สามารถนำสถานการณ์จำลองทางการแพทย์มาใช้ในหลักสูตรของวพม.ได้

สรุปก่อนจบการสนทนา

ในวันนี้เราสนทนากันถึงเรื่อง .....

หากท่านมีข้อสงสัย หรือรู้สึกไม่สบายใจโปรด คิดต่อผู้วิจัยได้โดยตรง

ขอบคุณทุกท่านที่เสียสละเวลา และหวังเป็นอย่างยิ่งว่าการสนทนา และเนื้อหาในการสนทนาจะเป็นที่น่าสนใจ ข้อมูลที่ท่านได้ให้มามีประโยชน์อย่างมากในการนำเอาการสร้างสถานการณ์จำลองทางการแพทย์มาปรับใช้ในหลักสูตรแพทยศาสตร์บัณฑิตของ วพม.

หากท่านมีข้อมูลที่จะเพิ่มเติมโปรดคิดต่อผู้วิจัยได้โดยตรง

ขอบคุณครับ

Institutional Review Board
Royal Thai Army Medical Department
APPROVED 26 NOV 2021

[redacted]

Appendix 4

Appendix 4a: Permission Letter and Ethical Approval (UoD Phase 1)

School of Medicine
University of Dundee

Undergraduate Medical School
Head of Undergraduate Medicine – Dr E Hothersall

Dr Ellie Hothersall
T: 01382 383812
e: e.hothersall@dundee.ac.uk

Tanongson Tienthavorn

Dear Tan,

'Translating the medical simulation approach from the Scottish to the Thai medical education system: An analysis of implementation'

Please accept this letter as formal confirmation of my willingness to support you in your research project, as outlined in the proposal emailed to me on the 11th December 2018. As explained previously, it is expected that your work will maintain the confidentiality of any participants, and also maintain the security and confidentiality of any assessment items you encounter.

We wish you well with your research.

Kindest regards

[redacted]

E Hothersall

SREC Standard Decision Letter Template
Version 1, 14th January 2019

University of Dundee

School of Medicine & School of Life Sciences Research Ethics Committee

University of Dundee
Dundee
DD1 4HN

04/03/2019

Dear Tanongson Tienthavorn
Application Number: UOD SMED & SLS SREC 19/09

Title of Project: Translating the medical simulation approach from the Scottish to the Thai medical education system: An analysis of implementation

I am writing to advise you that your ethics application has been reviewed and approved on behalf of the School of Medicine & School of Life Sciences Research Ethics Committee.

Any changes to the approved documentation (e.g., study protocol, information sheet, consent form) must be approved by this SREC before the changes are implemented. Requests for amendments should be requested using the Post-Approval Request for an Amendment form.

Approval is valid for the duration of the project, as stated in the original application. Should you wish your study to continue beyond the stated project end date, you must request an extension to this approval using the Post-Approval Request for an Extension form. The extension request must be lodged during your period of study and the period requested must not extend beyond the deadline for submission of your research project.

Yours sincerely

[redacted]

Carlos Wigderowitz
Convenor, School of Medicine and Life Sciences Research Ethics Committee

Appendix 4b: Permission Letter and Ethical Approval (UoD Phase 2)

Re: Requesting your agreement/consent to access simulation based medical education related data sources

Maggie Bartlett (Staff) <m.bartlett@dundee.ac.uk>
Tue 08/09/2020 11:53
To: Tan Tienthavorn (PG Research) <t.tienthavorn@dundee.ac.uk>

Dear Tan,
Your PhD topic is an interesting and timely one, and I'm happy to support it.
You have my permission to access the documents and to approach staff for interviews, subject to the necessary ethical approvals.
I hope the work goes well,
Best wishes
Maggie Bartlett

Professor Maggie Bartlett
Head of Undergraduate Division, School of Medicine
Chair of Education in General Practice
m.bartlett@dundee.ac.uk

University of the Year for Student Experience
The Times/Sunday Times Good University Guide 2020
1st in UK for Medicine, The Guardian's University Guide 2021 and in the Complete University Guide 2021

From: Tan Tienthavorn (PG Research) <t.tienthavorn@dundee.ac.uk>
Sent: 08 September 2020 10:38
To: Maggie Bartlett (Staff) <m.bartlett@dundee.ac.uk>
Subject: Requesting your agreement/consent to access simulation based medical education related data sources

Dear Prof Bartlett,

I am a student undertaking PhD in Medical Education at the University of Dundee.
The title of my study is ''Transformation of simulation based medical education pedagogy in the time of the COVID-19 pandemic: A case study analysis of undergraduate medical education"

Prior to undertaking the study, I am requesting your agreement/consent to access

- SBME related documents (organisational documents (e.g., policy documents, study guides, course materials, lesson plans, assessment materials, minute of meetings, where relevant)) for illustrating ideology and planned and intended aspects of the curriculum
- Faculty members for the individual interview session to indicate changes in SBME teaching and indicate what documents have informed and/or illustrated SBME changes and developments.

The additional information on my study is in the letter attached.

School of Medicine
University of Dundee

CW/ YG

8 September 2020

Tan Tienthavorn
University of Dundee

Dear Tan

SMED REC Number 20/ 69 – "Transformation of simulation based medical education pedagogy in the time of the COVID-19 pandemic: An analysis of undergraduate simulation based medical education"

Thank you for your application for Ethics Approval. A favourable opinion has been obtained from the School of Medicine Research Ethics Committee.

Any further changes should be communicated to the Committee and that will be seen as an amendment to the project.

Please send a report to the Committee at the end of the project for our records.

I hope your research project goes well.

Yours sincerely

[redacted]

Carlos Wigderowitz
Honorary Clinical Senior Lecturer

University of Dundee • School of Medicine, Mailbox 16, Ninewells Hospital & Medical School, Dundee, DD1 9SY
t: +44 (0)1382 383164 w: dundee.ac.uk
Registered Scottish Charity No: SC015096

Appendix 4c: Permission Letter and Ethical Approval (PCM)

The Institutional Review Board, Royal Thai Army Medical Department

317/5Rajavithi Road, Rajathevee, Bangkok 10400, Thailand

No. IRBRTA.....1732...../2021 Code: Q028h/64_Exp

Title of Project:	Simulation Based Medical Education in Scottish and Thai Medical School at pre and during the time of COVID-19: A Comparative Study (Part 2: A Case Study of the Thai Medical School
Protocol No.:	-
Principal Investigator:	Lieutenant Colonel Tanongson Tienthavorn
Name of Department:	School of Medicine University of Dundee, Phramongkutklao College Of Medicine
Study Site:	Phramongkutklao College Of Medicine

Approval documents	Reference (e.g. version and date)
Research protocol	(1) Submission Form for Ethical Review; Version 2 dated 21 Oct 2021 (2) Research Proposal; Version 2 dated 21 Nov 2021
Case of Record Form	(3) Evaluate Document; Version 2 dated 21 Nov 2021 (4) Interview Guide; Version 2 dated 21 Nov 2021
Informed Document	(5) Information Sheet and Informed Consent; Version 2 dated 21 Nov 2021
Curriculum Vitae (CVs)	(6) Lt.Col.Tanongson Tienthavorn; Version 1 dated 1 Oct 2021 (7) Dr. Stella Howden; Version 1 dated 20 Jan 2021 (8) Stuart Cable; Version 1 dated 1 Oct 2021

The aforementioned documents have been reviewed and approved by the Institutional Review Board, Royal Thai Army Medical Department incompliance with international guidelines such as Declaration of Helsinki, the Belmont Report, CIOMS Guidelines and the International Conference on Harmonization of Technical Requirements for Registration of Pharmaceuticals for Human Use - Good Clinical Practice (ICH - GCP)

สำนักงานคณะอนุกรรมการพิจารณาโครงการวิจัย พบ.

Date of Approval: 26 November 2021
Date of Expiration: 25 November 2022
Frequency of progress report submission: 1 Year

[redacted]
Colonel Suthee Panichkul, M.D.
Chairperson,
Institutional Review Board,
Royal Thai Army Medical Department

For all documents approved the Institutional Review Board, Royal Thai Army Medical Department (IRB RTA), investigators must comply with the followings:

1. Conduct the research in accordance with the approved protocol and the principles of research ethics as set forth in the Belmont Report.
2. Unless consent has been waived, conduct the informed consent process without coercion or undue influence, and provide the potential subject sufficient opportunity to consider whether or not to participate.
   - Use only the most current consent form bearing the IRB RTA "**APPROVED**" stamp
   - Use only recruitment documents / materials approved by the IRB RTA
3. IRB RTA approval is required before implementing any changes in the research protocol, information sheet and research-related documents unless those changes are required urgently for the safety of the research subjects.
4. Promptly report to the IRB RTA all unanticipated problems (adverse events, protocol deviations and violations and other problems) that meet all of the following criteria:
   - Unexpected (in terms of nature, severity or frequency);
   - Related or possibly related to participation in the research; and
   - Suggests that the research places subjects or others at a greater risk of harm than was previously known or recognized.
5. Any new information that may affect the risk and benefit of the research subjects must be promptly reported to the IRB RTA.
6. Summit to the IRB RTA a progress report (with currently used informed consent documents) for continuing review and for renewing the approval at least 30 days before expiration date.

สำนักงานคณะอนุกรรมการพิจารณาโครงการวิจัย พบ.

For failure to provide a progress report for continuing review to the IRB RTA, all research activities involving research subjects must stop. Enrollment of new subjects cannot occur after the expiration of the IRB RTA approval.

Please go to http://www.irbrta.pmk.ac.thto download IRB RTA forms for reporting.
Any questions, please contact the IRB RTA staff at (662) 763-4297, (662) 763-4270
E-mail:irbrta@yahoo.com

University of Dundee

Tan Tienthavorn
University of Dundee

20 December 2021

Dear Tan

SMED REC Number 21/ 165 – "Simulation Based Medical Education in Scottish and Thai Medical School contexts: pre and during the time of COVID-19: a Comparative Study. - Part 2: a Case Study of a Thai Medical School context"

I am writing to advise you that your ethics application has been reviewed and approved on behalf of the Schools of Medicine and Life Sciences Research Ethics Committee.

This approval is subject to the researcher ensuring that they comply with University and local/ national guidance and regulations in place due to the COVID-19 pandemic. The researcher must ensure that they keep abreast of changing guidance and regulations due to the fluidity of the situation.

Any changes to the approved documentation (e.g. study protocol, information sheet, consent form) must be approved by this SREC before the changes are implemented. Requests for amendments should be requested using the Post-Approval Request for an Amendment form.

Approval is valid for the duration of the project, as stated in the original application. Should you wish your study to continue beyond the stated project end date, you must request an extension to this approval using the Post-Approval Request for an Extension form. The extension request must be lodged during your period of study and the period requested must not extend beyond the deadline for submission of your research project.

I hope your research project goes well.

Yours sincerely

[redacted]

Dr Carlos Wigderowitz
Honorary Clinical Senior Lecturer

University of Dundee • Postgraduate Medicine, School of Medicine, Ninewells Hospital & Medical School, Dundee, DD1 9SY
t: +44 (0)1382 383519 w: dundee.ac.uk
Registered Scottish Charity No: SC015096

Appendix 5

Appendix 5a: Consent Form (UoD phase 1)

University of Dundee

CME Centre for Medical Education

Consent Form for Translating the medical simulation approach from the Scottish to the Thai medical education system: An analysis of implementation

Please tick the appropriate boxes	Yes
Taking Part	
I have read and understood the project information sheet dated …/……/…….	☐
I have been given the opportunity to ask questions about the project.	☐
I agree to take part in the project.	☐
I understand that my taking part is voluntary; I can withdraw from the study at any time and I do not have to give any reasons for why I no longer want to take part.	☐
I understand that myself and words may be video/audio recorded	☐
I understand that my pictures and words may be quoted in publications, reports, web pages, and other research outputs *(if applicable; e.g. for interviews).*	☐
Use of the information I provide beyond this project	
I agree for the data I provide to be archived at the Centre for Medical Education or University of Dundee's Box (Cloud Content Management system).	☐
I understand that other researchers will have access to this data only if they agree to preserve the confidentiality of the information as requested in this form.	☐
I understand that other genuine researchers may use my words in publications, reports, web pages, and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form.	☐

_____ _____

Name of participant [printed] Signature

_____

Date

Project contact details for further information: Names, phone, email addresses, etc.

Dr Tanongson Tienthavorn
PhD Student
Centre of Medical Education
Mackenzie Building
Ninewells Hospital and School of Medicine
University of Dundee
Email: ttienthavorn@dundee.ac.uk

Dr Stella Howden
Supervisor
Centre of Medical Education
Mackenzie Building
Ninewells Hospital and School of Medicine
University of Dundee
Email: s.howden@dundee.ac.uk

This project gained approval from the University Review Ethics Committee (Ref: UOD SMED & SLS SREC 19/09).

Appendix 5b: Consent Form (UoD phase 2)

University of Dundee

Informed consent
Version 1, 3rd September 2020

Informed Consent for "Transformation of simulation based medical education pedagogy in the time of the COVID-19 pandemic: A case study analysis of undergraduate medical education"

1. Taking part in the study	**Yes**	**No**
I have read the Participant Information Sheet. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	☐	☐
I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time up to two weeks after data collection is completed without having to give a reason.	☐	☐
I understand that taking part in the study involves an in-depth interview(s)	☐	☐
I agree to the interview being recorded with the understanding that the transcripts for the recording will be anonymised to protect my identity.	☐	☐
I understand that taking part in the study may involve in sensitive topic discussion as a potential risk.	☐	☐
I agree that if there is a disclosure of evidence of significant harm or risk of harm to self or others, the researcher will discuss the issue with the supervisory team in the first instance. Appropriate action will be taken if required.	☐	☐
2. Use of the information in the study		
I understand that the information I provide will be used for the thesis and subsequent dissemination.	☐	☐
I understand that personal information collected about me that can identify me, such as my name or where I live, will not be shared beyond the study team.	☐	☐
I agree that anonymised direct quotes can be used in research outputs.	☐	☐
I agree to joint copyright of my interview transcript(s) to the research team.	☐	☐
3. Future use and reuse of the information		
I give permission for anonymised transcripts from interview(s) that I provide to be deposited in a password-protected University space, so that it can be used for future research and training by the research team.	☐	☐

This project gained approval from the University Review Ethics Committee (Ref: SMED REC No. 20/69).

4. Signatures

Participant's Name	Participant's Signature	Date

By signing above, you are indicating that you have read and understood the Participant Information Sheet and that you agree to take part in this research study.

Name of Researcher	Signature of Researcher	Date
Tanongson (Tan) Tienthavorn		

5. Study contact details for further information

Dr Tanongson Tienthavorn
PhD Student
Centre for Medical Education
Mackenzie Building
Ninewells Hospital and School of Medicine
University of Dundee
Email: ttienthavorn@dundee.ac.uk

Dr Stella Howden
Supervisor
Centre of Medical Education
Mackenzie Building
Ninewells Hospital and School of Medicine
University of Dundee
Email: s.howden@dundee.ac.u

This project gained approval from the University Review Ethics Committee (Ref: SMED REC No. 20/69).

Appendix 5c: Consent Form (PCM)

University of Dundee

Version 1, 2nd December 2021

Consent Form for Simulation Based Medical Education in Scottish and Thai Medical School at pre and during the time of COVID-19: a Comparative Study (Part 2: a Case Study of the Thai Medical School)

Please tick the appropriate boxes	**Yes**
Taking Part	
I have read and understood the project information sheet dated …/……/…….	☐
I have been given the opportunity to ask questions about the project.	☐
I agree to take part in the project.	☐
I understand that my taking part is voluntary; I can withdraw from the study at any time and I do not have to give any reasons for why I no longer want to take part.	☐
I understand that myself and words may be video/audio recorded.	☐
I understand that my documents may be recorded.	☐
I understand that my pictures and words may be quoted in publications, reports, web pages, and other research outputs *(if applicable; e.g. for interviews)*.	☐
Use of the information I provide beyond this project	
I agree for the data I provide to be archived at the Centre for Medical Education or University of Dundee's Cloud Content Management system.	☐
I understand that other researchers will have access to this data only if they agree to preserve the confidentiality of the information as requested in this form.	☐
I understand that other genuine researchers may use my words in publications, reports, web pages, and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form.	☐

_____ _____

Name of participant [printed] Signature

_____

Date

Project contact details for further information:

Dr Tanongson Tienthavorn
PhD Student
Centre of Medical Education
Mackenzie Building
Ninewells Hospital and School of Medicine
University of Dundee
Email: ttienthavorn@dundee.ac.uk Dr

Dr Stella Howden
Supervisor
Centre of Medical Education
Mackenzie Building
Ninewells Hospital and School of Medicine
University of Dundee
Email: s.howden@dundee.ac.uk

This project gained approval from the University Review Ethics Committee (Ref: SMED REC Number 21/ 165).

หนังสือแสดงเจตนายินยอมเข้าร่วมการวิจัย

ชื่อโครงการวิจัย

การศึกษาเปรียบเทียบการเรียนการสอนแบบซิมมูเลชั่นของหลักสูตรแพทยศาสตรบัณฑิต มหาวิทยาลัยดันดี และวิทยาลัยแพทยศาสตร์พระมงกุฎเกล้า ในห้วงวิกฤติโควิด 19 (ส่วนที่ 2 กรณีศึกษาวิทยาลัยแพทยศาสตร์พระมงกุฎเกล้า

Simulation Based Medical Education in Scottish and Thai Medical School at pre and during the time of COVID-19: A Comparative Study (Part 2: A Case Study of the Thai Medical School)

วันที่ลงนาม.....

- ก่อนที่จะลงนามในใบยินยอมให้ทำการวิจัยนี้ ข้าพเจ้าได้รับการอธิบายจากผู้วิจัยถึงวัตถุประสงค์ของการวิจัย วิธีการวิจัย อันตราย หรืออาการที่อาจเกิดขึ้นจากการวิจัย รวมทั้งประโยชน์ที่คาดว่าจะเกิดขึ้นจากการวิจัยอย่างละเอียด และมีความเข้าใจดีแล้ว
- ผู้วิจัยรับรองว่าจะตอบคำถามที่ข้าพเจ้าสงสัยด้วยความเต็มใจ และไม่ปิดบังซ่อนเร้นจนข้าพเจ้าพอใจ
- ข้าพเจ้าเข้าร่วมในโครงการวิจัยนี้ด้วยความสมัครใจ โดยปราศจากการบังคับหรือชักจูง
- ข้าพเจ้ามีสิทธิที่จะบอกเลิกการเข้าร่วมในโครงการวิจัยเมื่อใดก็ได้ และการบอกเลิกนี้จะไม่มีผลต่อการรักษาพยาบาลที่ข้าพเจ้าจะพึงได้รับในปัจจุบันและในอนาคต
- ผู้วิจัยรับรองว่าจะเก็บข้อมูลเกี่ยวกับตัวข้าพเจ้าเป็นความลับ และจะเปิดเผยเฉพาะในรูปของสรุปผลการวิจัยโดยไม่มีการระบุชื่อนามสกุลของข้าพเจ้าการเปิดเผยข้อมูลเกี่ยวกับตัวข้าพเจ้าต่อหน่วยงานต่างๆ ที่เกี่ยวข้องจะกระทำด้วยเหตุผลทางวิชาการเท่านั้น
- ผู้วิจัยรับรองว่าหากเกิดอันตรายใดๆ จากการวิจัย ข้าพเจ้าจะได้รับการรักษาพยาบาล ตามที่ระบุในเอกสารชี้แจงข้อมูลแก่ผู้เข้าร่วมโครงการวิจัย
- ข้าพเจ้าจะได้รับเอกสารชี้แจงข้อมูลแก่ผู้เข้าร่วมโครงการวิจัย เก็บไว้ 1 ชุด
- ข้าพเจ้าได้รับทราบข้อความข้างต้น มีความเข้าใจดี และลงนามในใบยินยอมด้วยความเต็มใจ

ลงชื่อ.....ผู้เข้าร่วมโครงการวิจัย
(.....ชื่อ-นามสกุล ตัวบรรจง)

ลงชื่อ [redacted] ผู้ดำเนินโครงการวิจัย
(.....ชื่อ-นามสกุล ตัวบรรจง)

ลงชื่อ.....พยาน
(.....ชื่อ -นามสกุล ตัวบรรจง)

ลงชื่อ.....พยาน
(.....ชื่อ -นามสกุล ตัวบรรจง)

Institutional Review Boa [redacted]
Royal Thai Army Medical Departm
APPROVED 26 NOV 2021

Appendix 6

Appendix 6a: Information Sheet (UoD phase 1)

University of Dundee

CME Centre for Medical Education

Project title: Translating the medical simulation approach from the Scottish to the Thai medical education system: An analysis of implementation

Information sheet for Elite interview participants

Thank you for your interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate we thank you. A consent form in attached, please complete it and then return it to the researcher. However, if you decide not to take part there will be no disadvantages of any kind and we thank you for considering our request.

What is the aim of the project?

This study aims to gain an in-depth understanding of the Dundee medical simulation approach. We are interested in multiple data sources to understand the implementation of Simulation Based Medical Education (SBME) in Dundee. The interview is planned to be used to inform how the SBME has been implementing into the undergraduate curriculum. Once seeing the logical model, the other sources, including documents, observations and student focus group interviews, will be gathered and analysed to support the activities of the SMBE in practice context. The participants will be given brief information on the initial study idea from the information sheet already available which may be helpful for reference immediately prior to and during the interview.

What will participants be asked to do?

You will be asked to participate in an individual elite interview (about 30-45 minutes in duration). We would like our participants to reflect on past experiences and insights on implementing medical simulation based education including formal, informal and hidden curriculum.

Why you?

We are interested in the views and experiences of a group of individuals who have held strategic or influential positions in undergraduate SBME. We are seeking participants who have had various levels of participation in the undergrad SBME. As an individual faculty member, convenor, current and previous director, you can provide valuable information that can help us explore this approach.

Anonymity & Confidentiality

Everything that you say in this room or during the online (Voice over Internet Protocol) session will be kept confidential or private, with the exception of circumstances where it is likely to cause harm to you or to others. Your personal detail will not be shared outside research team. There will be no other interests involved and the data collected during the interviews will be used for publication of an academic paper. This may contain quotes from the interviews but your anonymity will be preserved. The recordings and transcripts including quotes used in the report will be identified by a signifier (code/false name) rather than your name.

Can participants change their mind of withdraw from the project?

Please be aware that you are free to withdraw from the study at any time without explanation and without any disadvantage to yourself. If you choose to withdraw after participation, your data will be removed.

This project gained approval from the University Review Ethics Committee (Ref: UOD SMED & SLS SREC 19/09).

University of Dundee

CME Centre for Medical Education

Notes:

This project involves an open-questioning technique (semi-structured interviews) where the precise nature of the questions which will be asked have not been determined in advance, but will depend on the way in which the interview develops. Consequently although the Ethic Committee is aware of the general areas to be explored in the interview, the Committee has not been able to review the precise questions to be used.

In the event that line of the questioning does develop in such a way that you feel hesitant or uncomfortable you are reminded of your right to decline to answer any particular question(s) and also that you may withdraw from the project at any stage without explanation and without any disadvantage to yourself of any kind.

What data or information will be collected and what use will be made of?

We will audiotape your in-depth interview. If you are not happy about the audio-recording, then you should not take part. Only direct members of the research team (Dr Stella Howden, Dr Stuart Cable, Dr Lysa Owen and Dr Tanongson Tienthavorn) will have access to the data. The data will be securely stored and the raw data will be destroyed 10 years after publication in accordance with research governance guidelines.

We will be writing a report about the findings and presenting them to Centre of Medical Education, School of Medicine, University of Dundee. Additionally, the results may be published or presented at conferences. It is important to note that any data included will be anonymous and not individually/institutionally identifiable. You will be asked to be/be able to check and approve what is reported. We anticipated this study will contribute to future SBE development.

Are there any advantages or disadvantages to participating in this study?

We anticipate that some people will benefit from having the opportunity to participate. For example, the study will give you opportunity to reflect on your experience of using a medical simulation based approach. Additionally, the findings from the project will directly inform future medical simulation development. The only identified disadvantage of your involvement in this study is the time commitment for interview.

What if you have any questions?

If you have any questions either now or in the future please contact Tanongson Tienthavorn:

Dr Tanongson Tienthavorn
PhD Student
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Ninewells Hospital and School of Medicine
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This project gained approval from the University Review Ethics Committee (Ref: UOD SMED & SLS SREC 19/09).

Appendix 6b: Information Sheet (UoD phase 2)

University of Dundee

CME Centre for Medical Education

Project title: Translating the medical simulation approach from the Scottish to the Thai medical education system: An analysis of implementation

Information sheet for Elite interview participants

Thank you for your interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate we thank you. A consent form in attached, please complete it and then return it to the researcher. However, if you decide not to take part there will be no disadvantages of any kind and we thank you for considering our request.

What is the aim of the project?

This study aims to gain an in-depth understanding of the Dundee medical simulation approach. We are interested in multiple data sources to understand the implementation of Simulation Based Medical Education (SBME) in Dundee. The interview is planned to be used to inform how the SBME has been implementing into the undergraduate curriculum. Once seeing the logical model, the other sources, including documents, observations and student focus group interviews, will be gathered and analysed to support the activities of the SMBE in practice context. The participants will be given brief information on the initial study idea from the information sheet already available which may be helpful for reference immediately prior to and during the interview.

What will participants be asked to do?

You will be asked to participate in an individual elite interview (about 30-45 minutes in duration). We would like our participants to reflect on past experiences and insights on implementing medical simulation based education including formal, informal and hidden curriculum.

Why you?

We are interested in the views and experiences of a group of individuals who have held strategic or influential positions in undergraduate SBME. We are seeking participants who have had various levels of participation in the undergrad SBME. As an individual faculty member, convenor, current and previous director, you can provide valuable information that can help us explore this approach.

Anonymity & Confidentiality

Everything that you say in this room or during the online (Voice over Internet Protocol) session will be kept confidential or private, with the exception of circumstances where it is likely to cause harm to you or to others. Your personal detail will not be shared outside research team. There will be no other interests involved and the data collected during the interviews will be used for publication of an academic paper. This may contain quotes from the interviews but your anonymity will be preserved. The recordings and transcripts including quotes used in the report will be identified by a signifier (code/false name) rather than your name.

Can participants change their mind of withdraw from the project?

Please be aware that you are free to withdraw from the study at any time without explanation and without any disadvantage to yourself. If you choose to withdraw after participation, your data will be removed.

This project gained approval from the University Review Ethics Committee (Ref: UOD SMED & SLS SREC 19/09).

University of Dundee

CME Centre for Medical Education

Notes:

This project involves an open-questioning technique (semi-structured interviews) where the precise nature of the questions which will be asked have not been determined in advance, but will depend on the way in which the interview develops. Consequently although the Ethic Committee is aware of the general areas to be explored in the interview, the Committee has not been able to review the precise questions to be used.

In the event that line of the questioning does develop in such a way that you feel hesitant or uncomfortable you are reminded of your right to decline to answer any particular question(s) and also that you may withdraw from the project at any stage without explanation and without any disadvantage to yourself of any kind.

What data or information will be collected and what use will be made of?

We will audiotape your in-depth interview. If you are not happy about the audio-recording, then you should not take part. Only direct members of the research team (Dr Stella Howden, Dr Stuart Cable, Dr Lysa Owen and Dr Tanongson Tienthavorn) will have access to the data. The data will be securely stored and the raw data will be destroyed 10 years after publication in accordance with research governance guidelines.

We will be writing a report about the findings and presenting them to Centre of Medical Education, School of Medicine, University of Dundee. Additionally, the results may be published or presented at conferences. It is important to note that any data included will be anonymous and not individually/institutionally identifiable. You will be asked to be/be able to check and approve what is reported. We anticipated this study will contribute to future SBE development.

Are there any advantages or disadvantages to participating in this study?

We anticipate that some people will benefit from having the opportunity to participate. For example, the study will give you opportunity to reflect on your experience of using a medical simulation based approach. Additionally, the findings from the project will directly inform future medical simulation development. The only identified disadvantage of your involvement in this study is the time commitment for interview.

What if you have any questions?

If you have any questions either now or in the future please contact Tanongson Tienthavorn:

Dr Tanongson Tienthavorn
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This project gained approval from the University Review Ethics Committee (Ref: UOD SMED & SLS SREC 19/09).

Appendix 6c: Information Sheet (PCM)

เอกสารชี้แจงข้อมูลแก่ผู้เข้าร่วมโครงการวิจัย
(Research Subject Information sheet)

ชื่อโครงการวิจัย

การศึกษาเปรียบเทียบการเรียนการสอนแบบซิมมูเลชั่นของหลักสูตรแพทยศาสตรบัณฑิต มหาวิทยาลัยดันดี และวิทยาลัยแพทยศาสตร์พระมงกุฎเกล้า ในห้วงวิกฤติโควิด 19 (ส่วนที่ 2 กรณีศึกษาวิทยาลัยแพทยศาสตร์พระมงกุฎเกล้า

Simulation Based Medical Education in Scottish and Thai Medical School at pre and during the time of COVID-19: A Comparative Study (Part 2: A Case Study of the Thai Medical School)

วันที่ชี้แจง
ชื่อผู้วิจัย/ผู้ร่วมวิจัย
พ.ท.ทนงสรรค์ เทียนถาวร
Dr Stella Howden
Dr Stuart Cable
สถานที่ทำงานของผู้วิจัย มหาวิทยาลัยดันดี สก็อตแลนด์ สหราชอาณาจักร
ผู้ให้ทุนวิจัย วพม.

ท่านได้รับการเชิญชวนให้เข้าร่วมในโครงการวิจัยนี้แต่ก่อนที่ท่านจะตกลงใจเข้าร่วมหรือไม่โปรดอ่านข้อความในเอกสารนี้ทั้งหมด เพื่อให้ทราบว่า ท่านได้รับเชิญให้เข้าร่วมในโครงการวิจัยนี้เนื่องการเป็นโครงการวิจัยเพื่อความเข้าใจกลยุทธ์ในการนำสถานการณ์จำลองทางการแพทย์และนวัตกรรมที่เกิดขึ้นในห้วงการระบาดของโควิด 19 ของทั้งสองสถาบัน (คณะแพทยศาสตร์มหาวิทยาลัยดันดี และวิทยาลัยแพทยศาสตร์พระมงกุฎเกล้า) จะทำให้สามารถเปรียบเทียบ วิเคราะห์ และวิพากษ์ความเหมือนและความแตกต่างเพื่อการพัฒนาการเรียนการสอนในอนาคตต่อไปได้อย่างเหมาะสมกับบริบททางแพทยศาสตรศึกษาที่มีการนำสถานการการณ์จำลองทางการแพทย์มาใช้ในการเรียนการสอน หากท่านเข้าร่วมโครงการวิจัยนี้ท่านจะต้อง ให้ความเห็น จากประสบการณ์ที่มีส่วนในการสถานการณ์จำลองทางการแพทย์มาใช้ และข้อเสียที่อาจจะเกิดขึ้นในระหว่างการวิจัย คือ ท่านอาจจะต้องออกความเห็นต่อการจัดทำหลักสูตรแพทยศาสตรบัณฑิตของ วพม.

ในเอกสารนี้ อาจมีข้อความที่ท่านอ่านแล้วยังไม่เข้าใจ โปรดสอบถามผู้วิจัยที่ทำโครงการนี้เพื่อให้อธิบายจนกว่าท่านจะเข้าใจท่านจะได้รับเอกสารนี้ 1 ชุด กลับไปอ่านที่บ้านเพื่อปรึกษาหารือกับญาติพี่น้อง เพื่อน หรือแพทย์ที่ท่านรู้จักให้ช่วยตัดสินใจว่าควรจะเข้าร่วมโครงการวิจัยนี้หรือไม่ การเข้าร่วมในโครงการวิจัยครั้งนี้จะต้องเป็นความสมัครใจของท่าน ไม่มีการบังคับหรือชักจูง ถึงแม้ท่านจะไม่เข้าร่วมในโครงการวิจัยท่านก็จะได้รับการรักษาพยาบาลตามปกติ การไม่เข้าร่วมหรือถอนตัวจากโครงการวิจัยนี้จะไม่มีผลกระทบต่อการได้รับบริการ การรักษาพยาบาลหรือ
ผลประโยชน์ที่พึงจะได้รับของท่านแต่อย่างใด

โปรดอย่าลงลายมือชื่อของท่านในเอกสารนี้จนกว่าท่านจะแน่ใจว่ามีความประสงค์จะเข้าร่วมในโครงการวิจัยนี้

โครงการวิจัยนี้มีที่มาอย่างไร และวัตถุประสงค์ของโครงการวิจัย

การนำสถานการณ์จำลองมาทดแทนสถานการณ์หรือผู้ป่วยจริงนั้น มีความสำคัญมากขึ้นเมื่อมีความต้องการให้ผู้เรียน หรือนักเรียนแพทย์ได้สัมผัสคนไข้(สมมติ) และระบบบริการทางการแพทย์(สมมติ)เร็วขึ้น ซึ่งแนวทางของ

แพทยศาสตรศึกษาในยุคใหม่ก็ให้ความสำคัญกับการเรียนรู้แบบบูรณาการเชิงระบบ การได้มีการฝึกทักษะ และมีการสะท้อนการเรียนรู้อย่างต่อเนื่อง เป็นขั้นเป็นตอน จากมีความซับซ้อนจากน้อยไปมากตามระดับของผู้เรียน การนำการสร้างสถานการณ์จำลองมาใช้ หากมีการวางแผนการนำมาใช้อย่างเหมาะสมในแต่ละระดับของผู้เรียน โดยเพิ่มระดับความซับซ้อนของสถานการณ์ขึ้นไปเพื่อเป้าหมายในการให้นักเรียนแพทย์เมื่อจบแล้วสามารถเข้าไปทำงานในสถานพยาบาลหรือชุมชนที่ทำงาน ได้อย่างมีประสิทธิภาพ จะเกิดประโยชน์อย่างมากต่อทั้งผู้เรียน และผู้ป่วยในอนาคต

ประสิทธิภาพของสถานการณ์จำลองทางการแพทย์นั้น อยู่ที่การออกแบบให้สามารถส่งผ่านความรู้ ประเมินความรู้ได้ การออกแบบสถานการณ์จำลองทางการแพทย์เพื่อให้สามารถส่งผ่านความรู้ ทักษะ ประสบการณ์ไปยังผู้เรียนได้นั้น จะต้องมีการเตรียมตัว และใช้ทรัพยากรและเวลาอย่างมาก ซึ่งกระบวนการที่จะทำให้เกิดภาพความสำเร็จของการนำสถานการณ์จำลองทางการแพทย์มาใช้ในองค์กรดังกล่าวจำเป็นต้องได้รับทั้งความตั้งใจ และความร่วมมือจากภาคส่วนต่างๆที่เกี่ยวข้องในการที่จะปรับเปลี่ยนความแนวคิดนั้นให้เข้ากับความต้องการและบริบททางสุขภาพ ตลอดจนความต้องการด้านแพทยศาสตรศึกษาของสถาบันนั้นๆ

หลักการพื้นฐานของการทำวิจัยแบบเปรียบเทียบหลักสูตร (comparing curriculum) จะช่วยให้สามารถศึกษามุมมองหลักสูตรและของอาจารย์ที่มีส่วนเกี่ยวข้องต่อการนำสถานการณ์จำลองทางการแพทย์ และกระบวนการนำนวัตกรรมการศึกษาใหม่ๆมาใช้ในบริบทของ วพม. การศึกษาแบบ case study ด้วยการสัมภาษณ์ (In-depth interview) และการนำการศึกษาเอกสาร (documentation analysis) มาใช้จะช่วยให้สามารถ เห็นมุมมองความคิดผ่านประสบการณ์ของการมีปฏิสัมพันธ์กับองค์กร ไม่ว่าจะเป็นความสัมพันธ์กับปัจจัยผลักดันให้เกิดการเปลี่ยนแปลงต่างๆ ทั้งนโยบาย บุคคลากร และแนวคิดหลักขององค์กรต่อการขับเคลื่อนองค์กร ได้เป็นองค์รวมมากขึ้น

ท่านได้รับเชิญให้เข้าร่วมโครงการวิจัยนี้เพราะคุณสมบัติที่เหมาะสมดังต่อไปนี้

อาจารย์สังกัด วพม. และ รพ.รร.6 (เป็นผู้บริหารหรือผู้มีประสบการณ์หรือผู้เชี่ยวชาญ) และมีส่วนเกี่ยวข้องในการออกแบบหลักสูตร พัฒนาหลักสูตรโดยใช้สถานการณ์จำลองทางการแพทย์ ทั้งในปัจจุบันและในอดีต

ท่านไม่สามารถเข้าร่วมโครงการวิจัยได้หากท่านมีคุณสมบัติดังต่อไปนี้

อาจารย์ที่สนใจ และไม่มีส่วนเกี่ยวข้องในการออกแบบหลักสูตร และพัฒนาหลักสูตรโดยใช้สถานการณ์จำลองทางการแพทย์

จะมีการทำโครงการวิจัยนี้ที่ใด และมีจำนวนผู้เข้าร่วมโครงการวิจัยทั้งสิ้นเท่าไร

วิทยาลัยแพทยศาสตร์พระมงกุฎเกล้า และโรงพยาบาลพระมงกุฎเกล้า จำนวนผู้ร่วมวิจัยในสถาบันมี 15-20 คน

ระยะเวลาที่ท่านจะต้องร่วมโครงการวิจัยและจำนวนครั้งที่นัด

ระยะเวลาที่ผู้ร่วมวิจัยแต่ละราย ต้องเข้าร่วมในการวิจัย จำนวนอย่างน้อย 1 ครั้ง ครั้งละ 45-60 นาที ในห้วงเวลา 3 เดือน (ธันวาคม 2564 (หรือหลังจากได้รับอนุมัติโครงการ) – กุมภาพันธ์ 2565)

หากท่านเข้าร่วมโครงการวิจัย ท่านจะต้องปฏิบัติตามขั้นตอน หรือได้รับการปฏิบัติอย่างไร

หากท่านเข้าร่วมโครงการวิจัย ท่านได้การคัดเลือกด้วยการเจาะจง (Purposive sampling) ในการศึกษานี้

วิธีดำเนินการวิจัย

สำหรับการสัมภาษณ์เชิงลึก ผู้วิจัยจะทำการประสานท่านเป็นการส่วนตัวผ่านทางช่องทางการสื่อสารทั้งด้วยวาจาผ่านช่องทางอินเตอร์เน็ตและทางจดหมายอิเล็คทรอนิกส์ (อีเมล์) เพื่อส่งเอกสารชี้แจงข้อมูลแก่ผู้เข้าร่วมวิจัยและ

สำนักงานคณะอนุกรรมการพิจารณาโครงการวิจัย พม.

Institutional Review Board
Royal Thai Army Medical Department
APPROVED 26 NOV 2021

[redacted]

หนังสือแสดงเจตนายินยอมเข้าร่วมการวิจัยให้กับทางผู้เข้าร่วมวิจัยได้ศึกษาและทำความเข้าใจ และนัดเวลาล่วงหน้าก่อนทำการวิจัย 1-2 เดือน เพื่อให้สามารถจัดตารางเวลาในการสัมภาษณ์เชิงลึกแบบตัวต่อตัว (ระยะเวลา 45-60 นาที) โดยผู้วิจัยจะประสานผู้เข้าร่วมวิจัยเพื่อไปอธิบายรายละเอียด วัตถุประสงค์ ความสำคัญ และประโยชน์ที่จะได้รับ ตลอดจนให้ข้อมูลที่เกี่ยวข้องทางจริยธรรมทางงานศึกษาวิจัย โดยเน้นย้ำว่าการศึกษานี้ จะรายงานผลในลักษณะของภาพเชิงระบบ ชื่อ ยศ ตำแหน่ง และหลักสูตรที่รับผิดชอบ (กรณีนี้อาจจะต้องการเอกสารประกอบในหลักสูตร) จะไม่ถูกเปิดเผย รหัสแทนชื่อ (Code) จะถูกนำมาใช้ โดยมีเพียงผู้วิจัยเท่านั้นที่ทราบ เพื่อให้ข้อมูลต่างๆไม่มีผลต่อผู้เข้าร่วมวิจัย ทั้งนี้ในวันที่ทำการสัมภาษณ์ผู้เข้าร่วมวิจัยสามารถเลือกสถานที่ที่จะทำการสัมภาษณ์และรูปแบบวิธีการสัมภาษณ์ตามที่ผู้เข้าร่วมวิจัยต้องการ และสามารถตัดสินใจที่จะหยุดและสามารถออกจากงานวิจัยได้หากต้องการ

สำหรับเอกสารประกอบในหลักสูตรที่มีอยู่ ผู้เข้าร่วมวิจัยสามารถส่งมาให้ก่อนการสัมภาษณ์เชิงลึกหรือหลังเสร็จสิ้นการสัมภาษณ์หรือยืนยันที่จะไม่ส่งให้ทางผู้วิจัยก็ได้หากไม่สะดวก

หลังจากการสัมภาษณ์เชิงลึก ผู้วิจัยอาจจะมีการติดต่อกลับไปยังผู้เข้าร่วมวิจัยเพื่อติดต่อสอบถาม ขอคำอธิบายเพิ่มเติมในบางหัวข้อที่สนทนา ตลอดจนขอคำอธิบายในส่วนของการวิเคราะห์และแปลความหมายเป็นภาษาอังกฤษเพื่อให้ความหมายของผู้เข้าร่วมวิจัยไม่สูญเสียไปในระหว่างกระบวนการวิเคราะห์และแปลความหมาย

ความไม่สุขสบาย หรือความเสี่ยงต่ออันตรายที่อาจจะได้รับจากกรรมวิธีการวิจัยมีอะไรบ้าง และวิธีการป้องกัน/แก้ไขที่ผู้วิจัยเตรียมไว้หากมีเหตุการณ์ดังกล่าวเกิดขึ้น

การตอบคำถามหรือร่วมในการสะท้อนประเด็นต่างๆ อาจทำให้ท่านเสียเวลา ท่านอาจรู้สึกไม่สบายใจในการตอบบางข้อคำถาม ซึ่งท่านสามารถเลือกไม่ตอบคำถามข้อนั้นๆ ได้

การเผยแพร่เอกสารประกอบหลักสูตรที่เกี่ยวข้อง หากท่านรู้สึกไม่สบายใจกับการเผยแพร่เอกสาร ท่านสามารถเลือกที่จะไม่เผยแพร่เอกสารนั้นได้

ประโยชน์ที่คาดว่าจะได้รับจากโครงการวิจัย

ประโยชน์ต่อผู้เข้าร่วมการวิจัย ผู้เข้าร่วมวิจัยได้สะท้อนกลับภายในตนเอง ทบทวนในนำสถานการณ์จำลองทางการแพทย์มาใช้ในหลักสูตรแพทยศาสตรบัณฑิต โดยเฉพาะอย่างยิ่งการจัดเรียนการสอนเพื่อให้นักเรียนแพทย์ได้มีประสบการณ์กับปัญหาทางคลินิกก่อนขึ้นชั้นคลินิก early clinical exposure และพัฒนาทักษะทางการแพทย์ด้านต่างๆตลอดหลักสูตร

ประโยชน์ต่อหลักสูตรแพทยศาสตรบัณฑิต วพม. เนื่องจาก วพม.กำลังมีการเปลี่ยนแปลง หลักสูตร และการบูรณาการเป็นแนวทางหนึ่ง ทั้งนี้การวางหลักสูตรของมหาวิทยาลัยดันดีเป็นต้นแบบหนึ่งในการบูรณาการหลักสูตรแพทยศาสตรบัณฑิตที่มีการดำเนินการมาเป็นระยะเวลาหนึ่งแล้ว กระบวนการวิจัยเปรียบเทียบนี้จะเป็นประโยชน์ต่อการนำแนวคิดมาใช้กับหลักสูตรของ วพม. เป็นอย่างยิ่ง

ประโยชน์ต่อแพทยศาสตร์ศึกษา การนำสถานการณ์จำลองทางการแพทย์ได้ถูกนำมาใช้มากขึ้น โดยเฉพาะอย่างยิ่งในยุคที่ต้องคำนึงถึงเรื่องของความปลอดภัยและสิทธิของผู้ป่วยเป็นสำคัญ การได้มีประสบการณ์และฝึกฝนผ่านสถานการณ์จำลองจะสามารถเข้ามาเสริมความพร้อมให้กับนักเรียนแพทย์เพื่อก้าวเข้าสู่วิชาชีพได้มาก ซึ่งจะเกิดประโยชน์ทั้งกับผู้เรียนและผู้ป่วยในอนาคต

ประโยชน์ต่อผู้ป่วย หากได้มีการเตรียมความพร้อมของนักเรียนแพทย์อย่างต่อเนื่อง จะทำให้นักเรียนสามารถนำความรู้ที่ได้ ไปใช้กับผู้ป่วยจริงได้อย่างมีประสิทธิภาพมากขึ้น ในชั้นคลินิก และในระดับวิชาชีพต่อไป

ประโยชน์ต่อวิทยาลัยแพทยศาสตร์พระมงกุฎเกล้า กระบวนการเรียนรู้ผ่านวิธีการ knowledge translation จะช่วยให้ วพม. สามารถนำวิธีคิด แนวทางการดำเนินงานของการนำการสร้างสถานการณ์จำลองทางการแพทย์มาปรับใช้ได้อย่างเหมาะสมกับบริบท และส่งต่อไปยังหน่วยการศึกษาต่างๆ อันเป็นผลที่จะทำให้สามารถใช้ศูนย์ฝึกสถานการณ์จำลองทางการแพทย์ทหารได้เกิดประโยชน์สูงสุดต่อองค์กร

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ค่าใช้จ่ายที่ผู้เข้าร่วมในโครงการวิจัยจะต้องรับผิดชอบ (ถ้ามี)

ผู้วิจัยรับผิดชอบค่าใช้จ่ายในการจัดสัมภาษณ์แบบออนไลน์ ผ่านระบบอินเตอร์เนต

ค่าตอบแทนที่จะได้รับเมื่อเข้าร่วมโครงการวิจัย(ถ้ามี)

ไม่มีค่าตอบแทน

หากท่านไม่เข้าร่วมโครงการวิจัยนี้ท่านมีทางเลือกอื่นอย่างไรบ้าง

ท่านสามารถเลือกที่จะไม่เข้าร่วมการวิจัยได้ตามที่ท่านต้องการ

หากเกิดอันตรายที่เกี่ยวข้องกับโครงการวิจัยนี้ จะติดต่อกับใครและได้รับการปฏิบัติอย่างไร

หากเกิดอันตราย ท่านสามารถติดต่อผู้วิจัย น.พ.ทนงสรรค์ เทียนถาวร ที่เบอร์โทรศัพท์ 44-7938441385 (24 ชั่วโมง) ซึ่งท่านจะได้รับการดูแลรักษาตามมาตรฐาน โดยผู้วิจัย (หรือผู้ให้ทุนวิจัย) จะรับผิดชอบค่าใช้จ่ายในการดูแลรักษา

หากท่านมีคำถามที่เกี่ยวข้องกับโครงการวิจัย จะถามใคร ระบุชื่อผู้วิจัยหรือผู้ร่วมวิจัย

พ.ท.น.พ.ทนงสรรค์ เทียนถาวร

เบอร์โทรศัพท์ 44-79-3844-1385 หรือทางอีเมล์ tanongson@gmail.com/ttienthavorn@dundee.ac.uk

หากท่านรู้สึกว่าได้รับการปฏิบัติอย่างไม่เป็นธรรมในระหว่างโครงการวิจัยนี้ ท่านอาจแจ้งเรื่องได้ที่

สำนักงานคณะอนุกรรมการพิจารณาโครงการวิจัย กรมแพทย์ทหารบก ชั้น 5 อาคารพระมงกุฎเกล้าเวชวิทยา วิทยาลัยแพทยศาสตร์พระมงกุฎเกล้า 317/5 ถนนราชวิถี เขตราชเทวี กรุงเทพฯ หมายเลขโทรศัพท์ 02-763-4297 และ 02-763-4270 หรือ ทางอีเมล์ irbrta@yahoo.com

ข้อมูลส่วนตัวของท่านที่ได้จากโครงการวิจัยครั้งนี้จะถูกนำไปใช้ดังต่อไปนี้

- ข้อมูลที่ได้จากโครงการวิจัยจะถูกนำเสนอเพื่อประโยชน์ทางวิชาการโดยไม่เปิดเผยชื่อนามสกุล ที่อยู่ของผู้ร่วมวิจัยเป็นรายบุคคล และมีมาตรการในการเก็บรักษาข้อมูลส่วนตัวและข้อมูลที่ได้จากโครงการวิจัยโดยมีเพียงวิจัยเท่านั้นที่จะสามารถระบุตัวตนของผู้ร่วมวิจัยได้ ข้อมูลของผู้ร่วมวิจัยทั้งหมดจะถูกเก็บในรูปของเอกสารอิเล็กทรอนิก ข้อมูลผู้เข้าร่วมวิจัยจะถูกเก็บเป็นความลับ ในการเก็บข้อมูลลงในคอมพิวเตอร์ และระบบฐานข้อมูลของมหาวิทยาลัยตันตี ที่มีรหัสผ่านเข้าถึงเฉพาะผู้วิจัยเท่านั้น เป็นเวลา 10 ปี

ท่านจะถอนตัวออกจากโครงการวิจัยหลังจากได้ลงนามเข้าร่วมโครงการวิจัยแล้วได้หรือไม่

- ผู้เข้าร่วมวิจัยสามารถตัดสินใจเข้าร่วมได้โดยสมัครใจ สามารถถอนการศึกษาได้หากมีข้อติดขัดประการใดที่ต้องการ และมีการขอความยินยอมจากผู้ร่วมวิจัยเป็นรายลักษณ์อักษรทุกครั้ง โดยกระบวนการดังกล่าวจะไม่มีการบังคับหรือเสนอประโยชน์ที่ไม่เหมาะสม
- ผู้เข้าร่วมวิจัยอาจถูกขอให้ออกจากโครงการ หากมีพฤติกรรมไม่เหมาะสม เช่น การเกิดข้อพิพาทในระหว่างสนทนา หรือ การนำความลับออกไปเผยแพร่โดยระบุตัวตน เป็นต้น

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หากมีข้อมูลใหม่ที่เกี่ยวข้องกับโครงการวิจัย ท่านจะได้รับแจ้งข้อมูลนั้นโดยผู้วิจัยหรือผู้วิจัยร่วมนั้นทันที (ในกรณีที่เป็นการวิจัยเกี่ยวข้องกับการรักษาโดยเฉพาะการใช้ยา)

- โครงการนี้ไม่เกี่ยวข้องกับการรักษา หรือเทคโนโลยีทางการรักษาใหม่ๆ แต่หากมีนวัตกรรม หรือรูปแบบทางการเรียนการสอนใหม่จะแจ้งข้อมูลให้ผู้ร่วมวิจัยทราบทันที

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[redacted]

University of Dundee

Version 1, 2nd December 2021

Project title: Simulation Based Medical Education in Scottish and Thai Medical School at pre and during the time of COVID-19: a Comparative Study (Part 2: a Case Study of the Thai Medical School)

Information sheet for Elite/expert interview participants

Thank you for your interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate we thank you. A consent form in attached, please complete it and then return it to the researcher. However, if you decide not to take part there will be no disadvantages of any kind and we thank you for considering our request.

What is the aim of the project?

This study aims to gain an in-depth understanding of the Thai medical school simulation-based medical education (SBME) approach. We are interested in multiple data sources to understand the implementation and innovation of SBME in Thailand. The interview is planned to be used to inform how the Thai undergraduate SBME has been implementing and innovating in the existing undergraduate curriculum. The participants will be given brief information on the initial study idea from the information sheet already available which may be helpful for reference immediately prior to and during the interview.

What will participants be asked to do?

You will be asked to participate in an individual elite/expert interview (about 45-60 minutes in duration) and demonstrating the documents used in your SBME sessions. We would like our participants to reflect on past experiences and insights on implementing and innovating SBME including formal, informal and hidden curriculum.

Why you?

We are interested in the views and experiences of a group of individuals who have held strategic or influential positions in Thai undergraduate SBME. We are seeking participants who have had various levels of participation in the undergraduate SBME. As an individual faculty member, current and previous director, you can provide valuable information that can help us explore this approach.

Anonymity & Confidentiality

Everything that you say in this room or during the online (Audiovisual/Voice over Internet Protocol) session will be recorded and kept confidential or private, with the exception of circumstances where it is likely to cause harm to you or to others. Your personal detail will not be shared outside research team. There will be no other interests involved and the data collected during the interviews will be used for publication of an academic paper. This may contain quotes from the interviews but your anonymity will be preserved. The documents given, recordings and transcripts including quotes used in the report will be identified by a signifier (code) rather than your name.

Can participants change their mind of withdraw from the project?

Please be aware that you are free to withdraw from the study at any time without explanation and without any disadvantage to yourself. If you choose to withdraw after participation, your data will be removed.

Notes:

This project gained approval from the University Review Ethics Committee (Ref: SMED REC Number 21/ 165).

University of Dundee

Version 1, 2nd December 2021

This project involves an open-questioning technique (semi-structured interviews) where the precise nature of the questions which will be asked have not been determined in advance, but will depend on the way in which the interview develops. Consequently, although the Ethic Committee is aware of the general areas to be explored in the interview, the Committee has not been able to review the precise questions to be used.

In the event that line of the questioning does develop in such a way that you feel hesitant or uncomfortable you are reminded of your right to decline to answer any particular question(s) and also that you may withdraw from the project at any stage without explanation and without any disadvantage to yourself of any kind.

What data or information will be collected and what use will be made of?

We will record your in-depth interview. If you are not happy about the audiovisual/audio-recording, then you should not take part. Only direct members of the research team (Dr Stella Howden, Dr Stuart Cable and Dr Tanongson Tienthavorn) will have access to the data. The data including the documents related to your experience given by you will be securely stored and the raw data will be destroyed 10 years after publication in accordance with research governance guidelines.

We will be writing a report about the findings and presenting them to Centre of Medical Education, School of Medicine, University of Dundee. Additionally, the results may be published or presented at conferences. It is important to note that any data included will be anonymous and not individually/institutionally identifiable. You will be asked to be/be able to check and approve what is translated and reported. We anticipated this study will contribute to future SBME development.

Are there any advantages or disadvantages to participating in this study?

We anticipate that some people will benefit from having the opportunity to participate. For example, the study will give you opportunity to reflect on your experience of using SBME approach. Additionally, the findings from the project will directly inform future medical simulation development. The only identified disadvantage of your involvement in this study is the time commitment for interview.

What if you have any questions?

If you have any questions either now or in the future please contact Tanongson Tienthavorn:

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Mackenzie Building
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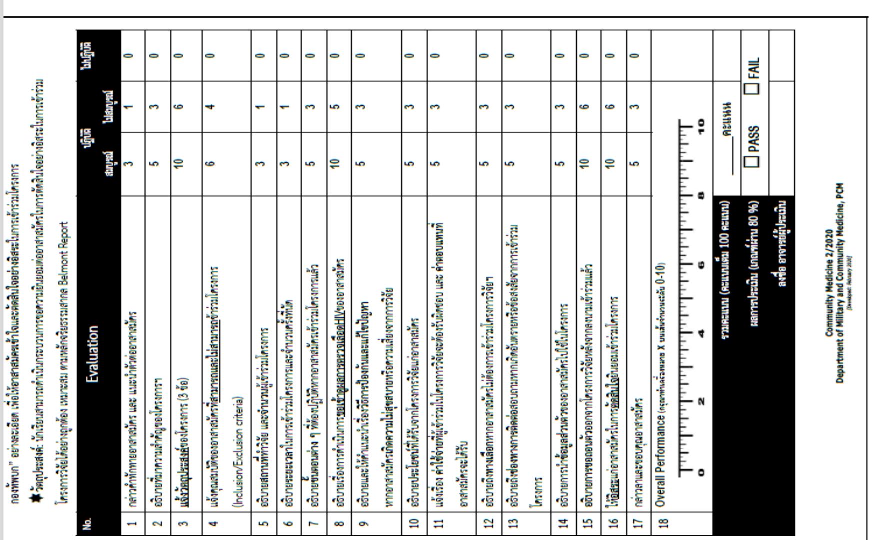
This project gained approval from the University Review Ethics Committee (Ref: SMED REC Number 21/ 165).

Appendix 7: OSCE-based SBME Used in Year 4 and Year 6 at PCM

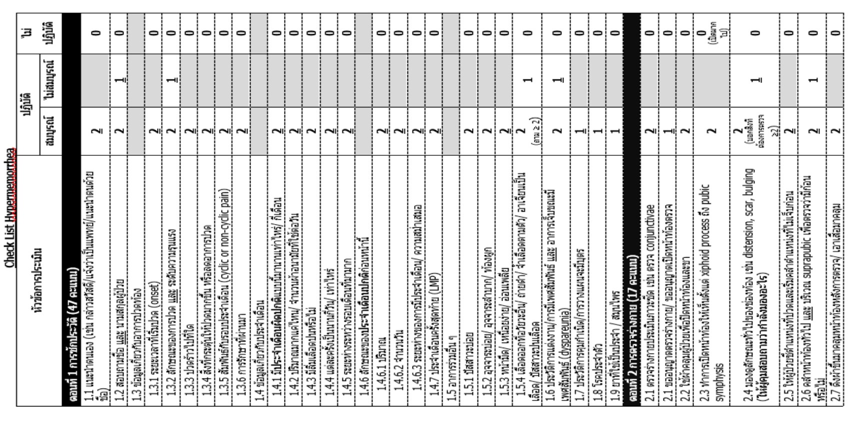


"กองทัพบก" อย่างละเอียด เพื่อให้อาสาสมัครเข้าใจและตัดสินใจอย่างอิสระในการเข้าร่วมโครงการ

★ วัตถุประสงค์: นักเรียนสามารถดำเนินกระบวนการขอความยินยอมต่ออาสาสมัครในการตัดสินใจอย่างอิสระในการเข้าร่วมโครงการวิจัยได้อย่างถูกต้อง เหมาะสม ตามหลักจริยธรรมสากล Belmont Report

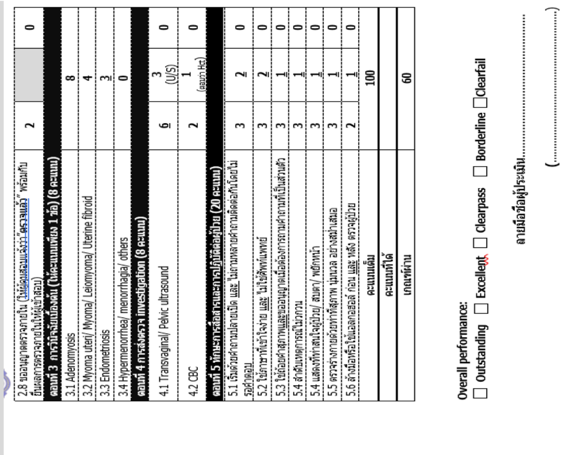
No.	Evaluation	ปฏิบัติ สมบูรณ์	ปฏิบัติ ไม่สมบูรณ์	ไม่ปฏิบัติ
1	กล่าวคำทักทายอาสาสมัคร และ แนะนำตัวต่ออาสาสมัคร	3	1	0
2	อธิบายที่มาความสำคัญของโครงการฯ	5	3	0
3	แจ้งวัตถุประสงค์ของโครงการ (3 ข้อ)	10	6	0
4	แจ้งคุณสมบัติของอาสาสมัครที่สามารถและไม่สามารถเข้าร่วมโครงการ (Inclusion/Exclusion criteria)	6	4	0
5	อธิบายสถานที่ทำวิจัย และจำนวนผู้เข้าร่วมโครงการ	3	1	0
6	อธิบายระยะเวลาในการเข้าร่วมโครงการและจำนวนครั้งที่นัด	3	1	0
7	อธิบายขั้นตอนต่าง ๆ ที่ต้องปฏิบัติหากอาสาสมัครเข้าร่วมโครงการแล้ว	5	3	0
8	อธิบายเรื่องการดำเนินการขอเข้าดูผลการตรวจเลือดHIVของอาสาสมัคร	10	5	0
9	อธิบายและให้คำแนะนำเรื่องวิธีการป้องกันและแก้ไขปัญหาหากอาสาสมัครเกิดความไม่สุขสบายหรือความเสี่ยงจากการวิจัย	5	3	0
10	อธิบายประโยชน์ที่ได้รับจากโครงการวิจัยแก่อาสาสมัคร	5	3	0
11	แจ้งเรื่อง ค่าใช้จ่ายที่ผู้เข้าร่วมในโครงการวิจัยจะต้องรับผิดชอบ และ ค่าตอบแทนที่อาสาสมัครจะได้รับ	5	3	0
12	อธิบายถึงทางเลือกหากอาสาสมัครไม่ต้องการเข้าร่วมโครงการวิจัยฯ	5	3	0
13	อธิบายถึงช่องทางการติดต่อสอบถามหากเกิดอันตรายหรือข้อสงสัยจากการเข้าร่วมโครงการ	5	3	0
14	อธิบายการนำข้อมูลส่วนตัวของอาสาสมัครไปใช้ในโครงการ	5	3	0
15	อธิบายการขอถอนตัวออกจากโครงการวิจัยหลังจากลงนามเข้าร่วมแล้ว	10	6	0
16	ให้อิสระแก่อาสาสมัครในการตัดสินใจยินยอมเข้าร่วมโครงการ	10	6	0
17	กล่าวลาและขอบคุณอาสาสมัคร	5	3	0
18	Overall Performance (คุณภาพโดยรวมคะแนน X ขนเส้นจำนวนระดับ 0-10) 0 2 4 6 8 10			
	รวมคะแนน (คะแนนเต็ม 100 คะแนน)	______คะแนน		
	ผลการประเมิน (เกณฑ์ผ่าน 80 %)	☐ PASS	☐ FAIL	
	ลงชื่อ อาจารย์ผู้ประเมิน			

Community Medicine 2/2020
Department of Military and Community Medicine, PCM
(Developed: February 2020)



Check List Hypermenorrhea

หัวข้อการประเมิน	ปฏิบัติ สมบูรณ์	ปฏิบัติ ไม่สมบูรณ์	ไม่ปฏิบัติ
ตอนที่ 1 การซักประวัติ (47 คะแนน)			
1.1 แนะนำตนเอง (เช่น กล่าวสวัสดี/แจ้งว่าเป็นแพทย์/แนะนำตนด้วยชื่อ)	2		0
1.2 สอบถามชื่อ และ นามสกุลผู้ป่วย	2	1	0
1.3 ข้อมูลเกี่ยวกับอาการปวดท้อง			
1.3.1 ระยะเวลาที่เริ่มปวด (onset)	2		0
1.3.2 ลักษณะของการปวด และ ระดับความรุนแรง	2	1	0
1.3.3 ปวดร้าวไปที่ใด	2		0
1.3.4 สิ่งที่กระตุ้นให้ปวดมากขึ้น หรือลดอาการปวด	2		0
1.3.5 สัมพันธ์กับรอบประจำเดือน (cyclic or non-cyclic pain)	2		0
1.3.6 การรักษาที่ผ่านมา	2		0
1.4 ข้อมูลเกี่ยวกับประจำเดือน			
1.4.1 มีประจำเดือนผิดปกติแบบนี้มานานเท่าไหร่/ กี่เดือน	2		0
1.4.2 ปริมาณมากแค่ไหน/ จำนวนผ้าอนามัยที่ใช้ต่อวัน	2		0
1.4.3 มีลิ่มเลือดปนหรือไม่	2		0
1.4.4 แต่ละครั้งเป็นนานกี่วัน/ เท่าไหร่	2		0
1.4.5 ระยะห่างระหว่างรอบเดือนที่มามาก	2		0
1.4.6 ลักษณะของประจำเดือนปกติก่อนหน้านี้			
1.4.6.1 ปริมาณ	2		0
1.4.6.2 จำนวนวัน	2		0
1.4.6.3 ระยะห่างของการมีประจำเดือน/ ความสม่ำเสมอ	2		0
1.4.7 ประจำเดือนครั้งสุดท้าย (LMP)	2		0
1.5 อาการร่วมอื่น ๆ			
1.5.1 ปัสสาวะบ่อย	2		0
1.5.2 อุจจาระบ่อย/ อุจจาระลำบาก/ ท้องผูก	2		0
1.5.3 หน้ามืด/ เหนื่อยง่าย/ อ่อนเพลีย	2		0
1.5.4 เลือดออกที่อวัยวะอื่น/ ถ่ายดำ/ จ้ำเลือดตามตัว/ อาเจียนเป็นเลือด/ ปัสสาวะปนเลือด	2 (ถาม ≥ 2)	1	0
1.6 ประวัติการแต่งงาน/การมีเพศสัมพันธ์ และ อาการเจ็บขณะมีเพศสัมพันธ์ (dyspareunia)	2	1	0
1.7 ประวัติการคุมกำเนิด/การวางแผนครอบครัว	1		0
1.8 โรคประจำตัว	1		0
1.9 ยาที่ใช้เป็นประจำ / สมุนไพร	1		0
ตอนที่ 2 การตรวจร่างกาย (17 คะแนน)			
2.1 ตรวจร่างกายประเมินภาวะซีด เช่น ตรวจ conjunctivae	2		0
2.1 ขออนุญาตตรวจร่างกาย/ ขออนุญาตเปิดหน้าท้องตรวจ	1		0
2.2 ให้ผู้ป่วยนอนหงายเพื่อเปิดหน้าท้องและขา	2		0
2.3 ทำการเปิดหน้าท้องให้เห็นตั้งแต่ xiphoid process ถึง pubic symphysis	2		0 (เปิดมากไป)
2.4 มองดูลักษณะทั่วไปของช่องท้อง เช่น distension, scar, bulging (ให้ผู้คุมสอบถามว่ากำลังมองอะไร)	2 (มองสิ่งที่ต้องการตรวจ ≥2)	1	0
2.5 ให้ผู้ป่วยชี้ตำแหน่งที่ปวดและเริ่มคลำตำแหน่งที่ไม่เจ็บก่อน	2		0
2.6 คลำหน้าท้องทั่วไป และ บริเวณ suprapubic เพื่อตรวจว่ามีก้อนหรือไม่	2	1	0
2.7 ดึงผ้าขึ้นมาคลุมหน้าท้องหลังการตรวจ/ เอาเสื้อมาคลุม	2		0



หัวข้อการประเมิน	ปฏิบัติ สมบูรณ์	ปฏิบัติ ไม่สมบูรณ์	ไม่ปฏิบัติ
2.8 ขออนุญาตตรวจภายใน (ให้ผู้คุมสอบแจ้งว่า "ตรวจแล้ว" พร้อมกับยื่นผลการตรวจภายในให้ผู้เข้าสอบ)	2		0
ตอนที่ 3 การวินิจฉัยเบื้องต้น (ให้คะแนนเพียง 1 ข้อ) (8 คะแนน)			
3.1 Adenomyosis		8	
3.2 Myoma uteri/ Myoma/ Leiomyoma/ Uterine fibroid		4	
3.3 Endometriosis		3	
3.4 Hypermenorrhea/ menorrhagia/ others		0	
ตอนที่ 4 การส่งตรวจ investigation (8 คะแนน)			
4.1 Transvaginal/ Pelvic ultrasound	6	3 (U/S)	0
4.2 CBC	2	1 (ตอบ Hct)	0
ตอนที่ 5 ทักษะการสื่อสารและการปฏิบัติต่อผู้ป่วย (20 คะแนน)			
5.1 เริ่มด้วยคำถามปลายเปิด และ ไม่ถามหลายคำถามติดต่อกันโดยไม่รอคำตอบ	3	2	0
5.2 ใช้ภาษาที่เข้าใจง่าย และ ไม่ใช้ศัพท์แพทย์	3	2	0
5.3 ใช้ถ้อยคำสุภาพและขออนุญาตเมื่อต้องการถามคำถามที่เป็นส่วนตัว	3	1	0
5.4 ลำดับเหตุการณ์ไม่วกวน	3	1	0
5.4 แสดงท่าทางสนใจผู้ป่วย/ สบตา/ พยักหน้า	3	1	0
5.5 ตรวจร่างกายด้วยท่าทีสุภาพ นุ่มนวล อย่างสม่ำเสมอ	3	1	0
5.6 ล้างมือหรือใช้แอลกอฮอล์ ก่อน และ หลัง ตรวจผู้ป่วย	2	1	0
คะแนนเต็ม		100	
คะแนนที่ได้			
เกณฑ์ผ่าน		60	

Overall performance:
☐ Outstanding ☐ Excellent ☐ Clearpass ☐ Borderline ☐ Clearfail

ลายมือชื่อผู้ประเมิน...

(...)