1. BEME Protocol Cover Sheet

A Best Evidence in Medical Education (BEME) Systematic Review of how technology is used during clinical placements to support the learning experience of undergraduate health-related profession students.

Review Team

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Conflict of Interest Statement

No conflicts are reported by the team members.

Abstract

Background: High quality clinical education is a fundamental component of undergraduate health-related professions programmes. Interventions which support and enhance the student learning experience during clinical placement, i.e. away from the university setting, are therefore of great importance. This review aims to systematically explore, evaluate and summarise the range of technological interventions within the literature regarding enhancement of the student learning experience during clinical placements. This will provide educators with the current best available evidence in order to select which technological intervention(s) may be utilised to support the learning experience of undergraduate health-related profession students during clinical placements.

Methods: A systematic review of the literature will be conducted using defined search terms, educational subject terms and medical subject headings (MeSH). A range of relevant databases will be searched alongside hand searching of citations and grey literature. Experimental studies with technological interventions designed to enhance student learning during clinical placement will be included. A modified version of the BEME coding form will be used for extraction and evaluation of data. MS Excel spreadsheets will be used for administration purposes and to record annotations or comments on the papers. It is anticipated that a mixture of qualitative and quantitative studies will be retrieved. A modified version of Kirkpatrick's levels will be used to evaluate interventions.

Results: The results of the review are likely to be both qualitative and quantitative studies, and the outcomes will be tabulated. From these results, a list of technological interventions will be produced to support the learning experience of undergraduate students of health-related professions during clinical placement and their potential uses.

Discussion: It is anticipated that the results of this review will be used to inform educational interventions to support the learning experience of undergraduate students of health-related professions during clinical placement.

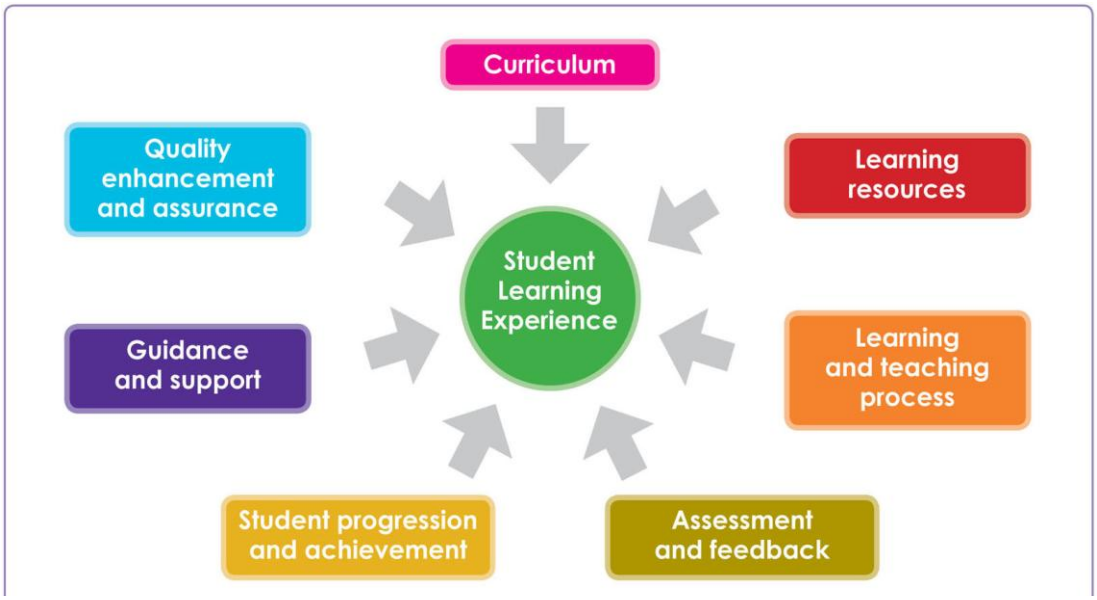
2. Background

The term "Health Professions" refers to a broad range of occupations including medicine and nursing alongside allied health professions such as occupational therapy, physiotherapy, podiatry, radiography, radiotherapy and speech and language therapy. Clinical placement is an essential component of undergraduate health-related profession programmes. For example, as part of the undergraduate degree programmes in Allied Health Professions within the UK, students are required to complete a minimum of 1000 clinical hours. Clinical placement, also known as workplace-based learning, may be defined as "any arrangement in which a … student is present in an environment that provides healthcare or related services to patients or the public. Placements can take place in primary, secondary or community healthcare or social care settings. Students can be actively involved in patient care or they can be observing health or social care processes." (Clinical Placements for Medical Students, 2009). This enables students to acquire and develop their professional skills and integrate theoretical knowledge into practice. Direct interaction with patients during clinical placement facilitates development of students' clinical judgement, which in turn leads to clinical competence to practise ensuring optimum and effective patient care (COP, 2013). High quality clinical education is therefore a fundamental component of undergraduate programmes of health-related professions.

The Student Learning Experience

The Higher Education Academy (HEA) define the student learning experience as "a broad range of learning experiences a student encounters within a higher education environment, from pre-arrival contact through to graduation… spanning both formal and informal domains" (HEA, 2019). It is widely agreed that the student learning experience comprises more than purely academic study and subsequent assessment, however some ambiguity exists regarding the variety of contributing factors. The Student Experience Network of the Society of Research in Higher Education aims to determine what students are learning in the widest sense of the word from their experiences within and beyond formal academic study (SRHE, 2019). The network lists a myriad of components including transition, accommodation, learning, internationalisation, diversity and inclusion, development and transformation, engagement, employability, satisfaction, representation and equality. Student Partnerships in Quality Scotland (SPARQS, 2019) provide an overview of elements contributing to the student learning experience (Figure 1).

Figure 1: Student Learning Experience (SPARQS, 2019)



A broad range of factors, including academic, environmental and social, all impact the student learning experience to varying extents. The cost and availability of clinical placements are limiting factors and therefore a move towards technological enhancements which will maximise the placement experience is an important consideration.

Impact of Clinical Placement

The clinical setting is dynamic, challenging, and occasionally stressful and time spent in this environment will greatly impact the student learning experience (Chesser-Smyth, 2005; McCloughen & Foster, 2018). Students face additional pressures of being away from familiarity of the university setting with potentially reduced peer and staff support. They may also be assessed during placement by clinical staff. Further to this, students are often placed within different clinical locations and therefore will encounter a variety of learning opportunities during their placement, i.e. no student will have an "identical" placement experience. This may be due to several factors including variety of clinical facilities; type of patients available; knowledge and experience of clinical tutors. Whilst such differences are not necessarily in themselves detrimental to students, educators are faced with the challenge of ensuring that students make best use of opportunities available to them within the clinical setting in order to maximise the overall placement learning experience. Variety in clinical placement experiences can also lead to challenges in ensuring that students are able to meet curriculum learning objectives during their placement. Interventions which support and enhance the student learning experience during clinical placement, i.e. away from the university setting, are therefore of great importance.

Scoping Exercise

A previous scoping exercise by the team examined the literature available regarding interventions (i.e. strategies and resources) used to support and enhance the learning experience of undergraduate healthcare professional students during clinical placement. Searches were conducted using Embase, CINAHL, Medline and SCOPUS for articles in the English language from date of database inception to June 2019. Keyword searches relating

to clinical placement (e.g. student placement, workplace-based learning, clinical education) and support (e.g. learner support or assistance) were conducted for the following health professions: Physiotherapy, Nursing, Occupational Therapy, Podiatry, Radiography, Radiotherapy, Speech and Language Therapy. Articles that examined interventions occurring during clinical placement (i.e. students were at a site away from university campus such as a hospital or community clinic) were selected. 3289 articles were screened against inclusion/exclusion criteria, and 41 were selected for review. The scoping exercise identified a broad range of interventions which could be placed in the following categories:

- Models of placement e.g. dyad, triad or cluster models, hub-and-spoke models (13)
- Technology-based strategies e.g. video-conferencing, emails, blogging, social media (18)
- Organisational strategies e.g. specialist placement teams on site (10)

Existing reviews of clinical placement have focussed on specific aspects, for example, inter-professional learning (Olson & Bialocerkowski, 2014), facilitating reflective practice (McLeod et al., 2015) and the use of summative assessment (Helminen et al., 2016). Both Lekkas et al. (2007) and Franklin (2013) have conducted reviews of placement supervision models. Other research has examined the use of technology during placement (Lea & Callaghan, 2011), whilst a recent BEME review focussed specifically on the use of hand-held devices by students during placement (Maudsley et al., 2018).

In light of the previous scoping exercise conducted by the team and initial feedback on BEME protocol by BICC panel, the present review will focus on technology-based strategies which may be used to support and enhance the learning experience of undergraduate students of health-related professions during their clinical placement. Refinements have been made to the initial scoping strategy as follows:

- Inclusion of more databases and refinement of the search strategy (e.g. forward citation searching and hand searching of key journals)
- Expansion of included professions to encompass a broader range of health-related professions
- Widening the geographical ambit beyond UK and Ireland (N.B. when reviewing articles attention will be paid to the description of clinical placement. Specifically, placement should occur in a clinical setting separate to university e.g. a hospital ward or community clinic, and students should be involved directly in treatment and management of patients)
- Inclusion of an Information Specialist to the review team to shape the search strategy.

The proposed review is novel in that it will establish and evaluate the literature regarding the range of technological methods that are used to support the student learning experience during clinical placement for undergraduate health-related profession students.

Review aim

The aim of this systematic review is to explore and evaluate the literature regarding technological methods that are used to support the student learning experience during clinical placement. The proposed review will provide educators with the current best

available evidence in order to select which technological intervention(s) may best be utilised to provide support and facilitate learning for undergraduate health-related profession students during their clinical placement.

Table 1: Definition of specific terms

TERM	DEFINITION
Health-related Professions	Range of professions including medicine, nursing, occupational therapy, physiotherapy, podiatry, radiography, radiotherapy and speech and language therapy.
Clinical Placement	Period of time spent by the student in a clinical setting for the purpose of acquiring and development knowledge and skills relevant to their professional programme. For the purposes of the review, clinical placement will further be defined as occurring within the clinical setting rather than a university location (e.g. onsite clinic). (Other terms: Practice Placement, Clinical Work Placement, Practice Learning).
Placement Educator	A member of clinical staff at the site providing the clinical placement who typically acts as a mentor for the student and may be involved in their assessment. (Other terms: Practice Educator, Clinical Educator, Clinical Tutor, Educational supervisor, clinical supervisor, preceptor).
Placement Coordinator	A member of academic staff who organises clinical placement and supporting students with placement preparation. (Other terms: Placement Facilitator, Practice Learning Coordinator).

3. Review question(s)/objectives, type of review and keywords

This systematic review of the literature will examine and evaluate the literature regarding technological methods which are used to support the student learning experience during clinical placement.

The main research question is:
What technological methods are used during clinical placement to support the learning experience of undergraduate health-related profession students?

The review objectives are:
- To establish and describe the technological methods that are currently being used during clinical placement to support the learning experience of undergraduate students of health-related professions (Description)
- To identify the effectiveness of the technology intervention on student learning experience
- To evaluate the evidence supporting the use of these methods
- To determine when such methods are recommended for use (Context)
- To determine the limitations/ barriers to implementation and use of these methods e.g. Wi-Fi availability, disturbance of clinical activity (Clarification)

Intended Search Terms
Search terms have been developed with the support of the information specialist (Subject Assistant Librarian), building on the earlier scoping exercise to identify available literature. The following terms will be searched alongside educational subject terms and medical subject headings (MeSH), using Boolean operators and truncation as appropriate (Table 2). A sample search strategy conducted using Medline is included in appendix 1.

Table 2: Search Terms

PLACEMENT LEARNING	POPULATION	TECHNOLOGY-RELATED
Student placement	Students, Health Occupations	technolog*
Clinical placement	Health professional student	blog*
Field placement	Allied health student	video conf* or videoconf*
Workplace based learning	Undergraduate student	mobile phone*
Clinical education	Physicians	smart phone*
Clinical learning	Allied health profession*	web based support
Practice education	AHPs	sms
Preceptorship	Doctor*	mms
Student learning	Medical student	online or on-line
Learner support or assistance	Nurse*	whatsapp
	Midwife*	facebook
Student experience	Podiatr* or chiropod*	twitter
Placement experience	Dietitian*	social media
Placement support	Occupational therap* or OT Practitioner	
	Physiotherap* or PT	
	Radio*	

	Speech or SLT Dent* Pharmac* Paramed*	

4. Study selection Criteria

Inclusion criteria

The criteria below will be used to determine the inclusion of studies to this review. A summary table of the inclusion/exclusion criteria is included in Appendix 2.

Population

Students enrolled in undergraduate degree programmes in Health-related Professions. This includes the following professions: Medicine, Nursing, Dentistry, Podiatry, Physiotherapy, Radiography, Occupational Therapy, Speech & Language Therapy, Dietetics. Postgraduate students will not be included – in contrast to undergraduate students (who are acquiring basic key skills essential for their profession) they are acquiring additional, advanced skills. Postgraduate students have also been found to adopt a different learning style and have different support needs in comparison to undergraduate students (Humphrey & McCarthy, 1999; Samarakoon et al., 2013).

Intervention

The PICOT format typically defines an intervention as a treatment provided to study participants (Riva et al., 2012). For the purposes of this review, "intervention" refers to a technology-based strategy that is employed by university educators for the specific purpose of facilitating students learning experience during the placement. The strategy will involve encouraging/facilitating student engagement with learning opportunities during clinical placement such as case studies, clinical scenarios, reflection on practice. Some examples of this are listed below (table 3):

Table 3: Examples of Technology-based strategies to facilitate student learning experience during clinical placement

REFERENCE	PROFESSION	TECHNOLOGICAL SUPPORT STRATEGY
Furness & Kaltner (2015)	Occupational Therapy	Video-conferencing sessions for students to debrief, engage in reflection on clinical practice and participate in peer-supported learning through discussion.
Morley (2014)	Nursing	Online communication tools (Facebook, wiki, email) used to support the clinical learning of student nurses in practice
Tan et al (2010)	Physiotherapy	Blogging during clinical placement to develop clinical reasoning skills

As this review is exploratory in nature, all types of intervention involving use of technology will be considered for inclusion. However, the intervention must occur during the clinical placement i.e. students are at a clinical site away from the university setting such as a hospital or community clinic. It is anticipated from an initial exploration of the literature that the following interventions may be identified:

- Use of handheld devices e.g. smartphones, PDAs

- Online and offline resources e.g. blogging sites, apps
- Technology based communication methods e.g. SMS, MMS, email
- Social media e.g. Facebook, Twitter.

Comparators
Comparators of interventions will be considered.

Outcome measures
Studies reporting outcomes relating specifically to the student will be considered. Based upon previous scoping, it is anticipated that outcomes will align with Kirkpatrick's hierarchy (Yardley & Dornan, 2012).

Types of studies
A previous scoping exercise identified a variety of primary research studies meeting the inclusion criteria. Therefore, it is anticipated that the present review will identify comparative and descriptive studies of the following designs:
- Cohort studies
- Controlled trials
- Case control studies
- Observational studies
- Qualitative studies

All study dates will be included within the review. Relevant systematic reviews will not be included in this review but will be searched for eligible studies. Studies which are purely descriptive, commentaries, editorials or letters will be excluded from the review.

Exclusion criteria
The following exclusion criteria will be applied during title and abstract screening (Table 4).

Table 4: Exclusion Criteria

Reason for Exclusion	**Example**
Does not meet population criteria	- Non-health professions related training - Other disciplines e.g. social work, pharmacy, paramedics - Post graduate training
Intended outcomes are not specifically related to student learning experience	- Intended outcomes primarily concerning clinical educators, academic lecturers, clinical department - Other primary intended outcomes e.g. inter-professional learning
Intervention does not occur during the clinical placement	- Interventions occur pre-placement e.g. preparation for placement
Research does not involve technology-based strategies/resources/decision support	
Duplicate studies	

5. Search Sources and Strategies

The following databases will be searched using the key terms described in Section 3 above (Table 2) alongside educational subject terms and medical subject headings (MeSH), using Boolean operators and truncation as appropriate.

- CINAHL (Cumulative Index to Nursing and Allied Health Literature)
- Embase
- ERIC (Educational Resources Information Center)
- Medline
- PsychINFO
- Proquest Education Database
- Scopus
- Web of Science

Databases will be searched from date of inception to January 2020. The reference sections of selected studies will be searched in order to identify further studies which may meet the eligibility criteria. Forward citation searching will also be used to identify literature, including the use of Google Scholar to review "cited by" information. Grey literature will be searched using OpenGrey. Hand searching of key journals will be conducted. The search strategy has been developed with the support of the Information Specialist (KM).

The lead reviewer (AJ) will conduct and save each database search with the support of the review team Information Specialist (KM). Study titles and abstracts will be screened by two members of the review team (lead reviewer plus one other) and the full text of studies which meet the eligibility criteria will be obtained. Full text of articles will be screened by two members of the review team (lead reviewer plus one other). Where there is disagreement between reviewers during this process, a third member of the review team will be consulted to agree a consensus viewpoint. RefWorks will be used to store and manage citations. A PRISMA flow diagram will be used to record the screening and selection process (Liberati et al., 2009).

6. Extraction of data

MS Excel will be used to record key characteristics of studies, including participant details (e.g. profession, year of training, sample size) and details of intervention (including comparators). Data will be extracted to an excel spreadsheet by two members of the review team (lead reviewer plus one other). Each member will complete separate data extraction sheet (sample data extraction spreadsheet - Appendix 3). A data extraction form based on BEME guidance (Hammick et al., 2010) was piloted and refined as part of the scoping exercise and will be used by the review team (Appendix 4).

7. Appraisal of studies

To ensure consistency, all studies will be separately appraised by the lead reviewer (AJ) and one other member of the review team. MS Excel will be used to capture and facilitate comparison of data with comparisons made between reviewers. Where there is disagreement, a third member of the review team will appraise the article to reach consensus viewpoint.

Reported outcomes will be recorded using Maxwell's 6 dimensions of quality (Maxwell, 1992), which has been used by previous systematic reviews (Maudsley et al., 2018) to assess quality of intervention relating to:

(i) effectiveness of the technology strategy for supporting the student learning experience during clinical placement (how it is perceived to work)
(ii) acceptability (student preference and satisfaction)
(iii) efficiency (relating outputs to inputs)
(iv) access (including barriers to implementation and uses, benefits and drawbacks)
(v) equity ("fairness" of the strategy relating to the student and professionalism)
(vi) relevance (appropriateness of the strategy for supporting the student learning experience during clinical placement).

Previous BEME review teams have defined effectiveness relating to teaching strategies as an improvement in learner outcomes in one or more of the following domains: professionalism, clinical reasoning, medical knowledge, physical examination, empathy, patient-centredness and communication (Pierce et al, 2017). A BEME review by Issenberg et al. (2005) recorded the following clinical educational outcome domains: clinical skills; practical procedures; patient investigation; patient management; health promotion; communication; information skills; integrating basic sciences; attitudes and decision-making. It is anticipated that learner outcome from the present review may be reported in similar areas. As part of the appraisal process, the team will tabulate reported learner outcomes and categorise these into domains during synthesis of findings.

As per previous BEME reviews, effectiveness of intervention claims will also be classified using a modified version of Kirkpatrick Hierarchy will be used to evaluate study outcomes (Table 5) (Pallari et al. 2019; Uygur et al. 2019).

Table 5: Kirkpatrick Hierarchy (Barr et al., 2006)

Level 1	**REACTION**	Participants' views on the learning experience, its organisation, presentation, content, teaching methods, and quality of instruction.
Level2A	**LEARNING**- Change in attitudes	Changes in the attitudes or perceptions among participant groups towards teaching and learning.
Level2B	**LEARNING**- Modification of knowledge or skills	For *knowledge*, this relates to the acquisition of concepts, procedures and principles; for *skills*, this relates to the acquisition of thinking/problem-solving, psychomotor and social skills.
Level3	**BEHAVIOUR** - Change in behaviours	Documents the transfer of learning to the workplace or willingness of learners to apply new knowledge & skills.
Level4A	**RESULTS** - Change in the system / organizational practice	Refers to wider changes in the organization, attributable to the educational program.
Level4B	**RESULTS** - Change among the participants' students, residents or colleagues	Refers to improvement in student or resident learning/performance as a direct result of the educational intervention.

The methodological strength of eligible studies will be appraised using the BEME "Strength of Findings" model (Hammick et al., 2010) as described below (Table 6).

Table 6: BEME "Strength of Findings" model (Hammick et al., 2010)

Please rate strength of findings using the following scale:	
1	No clear conclusions can be drawn. Not significant.
2	Results weak/ambiguous, but there appears to be a trend.
3	Conclusions can probably be based on the results.
4	Results are clear and very likely to be true.
5	Results are unequivocal

Decisions regarding assessment of research quality will be based upon key quality indicators adopted from Hothersall *et al.* (2016) as cited by Pallari *et al.* (2019) (Table 7). The review team have refined this tool to exclude psychometrics as it is anticipated that not all identified studies will include psychometric testing, which would impact on the overall study score.

Table 7: Strength of Findings - Quality Assessment (Adopted from Hothersall *et al.* 2016)

Quality indicator	Good quality	Unclear quality	Low quality
Underpinning framework	Clear and relevant description of theoretical models or conceptual frameworks that underpin the choice of assessment	Some limited discussion of underpinning, with minimal interpretation in the context of the assessment choice	No mention of underpinning
Assessment method	Clear description of the process and outcomes of the assessment	Some limited description that will not facilitate replication	No mention of assessment method in any detail
Setting	Clear details of the educational context and learner characteristics of the study	Some description, but not significant as to support dissemination	No details of learner characteristics or setting
Context	Provision of detailed materials (or details of access), such as mark sheets, rubrics, etc. to allow assessment replication	Some elements of materials presented or summary information	No assessment content presented
Conclusions	Conclusions of the study reflect the findings	Some mismatch between the conclusions and findings	No correlation between the findings and conclusions

8. Synthesis of evidence and transfer to research and practice

Narrative synthesis is recommended where alternative synthesis methods are inappropriate due to variation in research designs producing qualitative and/or quantitative findings (Popay *et al.*, 2006). Based on results of previous scoping, findings are likely to be both qualitative and quantitative. Due to the anticipated heterogenicity of the data, the potential for any statistical analysis is unlikely. Following initial exploration of the literature it is anticipated that technological strategies will be categorised into 4 groups: (i) handheld devices e.g. smartphones, PDAs; (ii) online and offline resources e.g. blogging sites, apps; (iii) communication methods e.g. SMS, MMS, email; and (iv) social media e.g. Facebook, Twitter.
Findings will be presented in a narrative format grouped according to the above categories.

Research outcomes (i.e. Kirkpatrick levels), strength of findings and study quality will be tabulated and presented. During synthesis, consideration will be given to the four key elements of the general framework for narrative synthesis as described by Popay *et al.* (2006):

1. Developing a theory of how the intervention works, why and for whom
2. Developing a preliminary synthesis of findings of included studies
3. Exploring relationships in the data
4. Assessing the robustness of the synthesis.

Anticipated Outcomes and Implications for Educational Research and Practice
It is anticipated that the findings from this review will be used to provide educators with the current best available evidence to assist selection of technology-based intervention(s) to provide support and facilitate learning for undergraduate health professional students during their clinical placement. The review recommendations will include:

1. A summary of current technology-based strategies used to support learning during clinical placement for undergraduate students of health-related professions.
2. Detail regarding the implementation of the strategies
3. Analysis of the effectiveness of those strategies
4. Suggestions for further research to develop the evidence base in this area.

It is anticipated that the completed systematic review will be submitted for peer-review and publication in a medical education journal.

9. Project Timetable

Pilot literature search:	March 2018 – March 2019
Topic registration/ acceptance:	March/April 2019 (Topic Reg No 0125)
Protocol submission/ acceptance:	June/July 2019
Protocol resubmission/ acceptance:	February/March 2020
Final literature search and data extraction:	March 2020 – May 2020
Analysis & synthesis:	May 2020 - January 2021
Review report submission:	February 2021

10. Conflict of interest statement

The research team has no conflicts of interest to declare.

11. Plans for updating the review and further research

It is anticipated that the bibliography relating to the review question will be updated by the team as necessary and depending upon availability. Should any significant developments in the evidence base occur, it is proposed that an update of the review takes place.

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Appendices

Appendix 1: Search Strategy – Medline

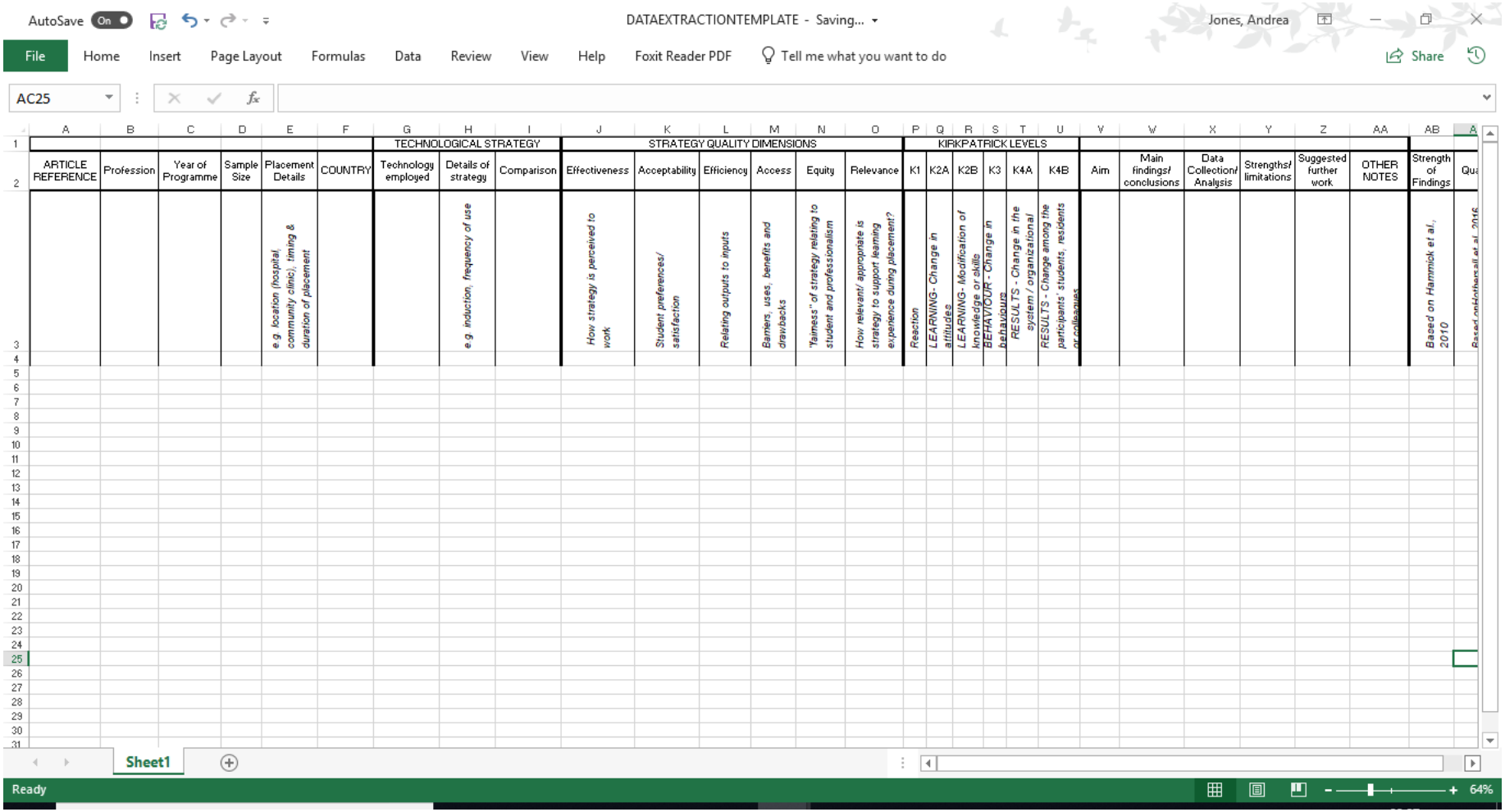
1. Preceptorship/
2. Students, Health Occupations/
3. (Placement adj4 (student or clinical or field or workplace)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
4. 1 or 2 or 3
5. Allied Health Occupations/
6. Nurses/
7. Physicians/
8. (allied health profession* or AHPs or doctor* or Nurse* or podiatr* or chiropod* or dietitian* or occupational therap* or OT or practitioner or physiotherap* or PT or radio* or speech or SLT or dentist*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
9. 5 or 6 or 7 or 8
10. (support or assistance or help).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
11. (support adj4 (student learn* or student experience)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
12. 10 or 11
13. (technolog* or blog* or video conf* or videoconf* or mobile phone* or smart phone* or web based support).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
14. (sms or mms or online or on-line or whatsapp or facebook or twitter or social media).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
15. 13 or 14
16. 4 and 9 and 12 and 15

Appendix 2: Inclusion/exclusion Criteria

Inclusion criteria	Exclusion criteria
Research involves undergraduate students of health-related professions (Medicine, Nursing, Dentistry, Podiatry, Physiotherapy, Radiography, Occupational Therapy, Speech & Language Therapy, Dietetics).	Does not meet population criteria
Research relates to a technology-based strategy that is employed by University educators for the specific purpose of facilitating students learning experience during the placement.	Intended outcomes are not specifically related to student learning experience
Technological strategy occurs during clinical placement (away from the university setting)	Intervention does not occur during the clinical placement
	Duplicate studies

A Best Evidence in Medical Education (BEME) Systematic Review of how technology is used during clinical placements to support the learning experience of undergraduate health-related profession students.

Appendix 3: Sample data extraction spreadsheet



A Best Evidence in Medical Education (BEME) Systematic Review of how technology is used during clinical placements to support the learning experience of undergraduate health-related profession students.

Appendix 4: Data Extraction Pro-Forma

Please complete this form electronically whenever possible.

1. Administrative

Reference Number: Reviewer Initials: Date:

- Citation Type:

Book		**Journal article**	
Non-peer review article		Conf. paper/ proceedings	
Official publication		Thesis	
Other			

- Citation:

AUTHOR(S):			
TITLE:			
PUBLICATION:			
YEAR:	VOL:	ISSUE:	PAGES:

- Search Method:

Electronic Search		Other:	
Hand Search			

- Type of Study:

Opinion/ commentary		Research study		Meta-analysis	
Program description, no date		Literature review		Other:	
Program description, evaluation date		Systematic review of the literature			

2. Expected Learning Outcomes of the Intervention (Check all that apply).

This section relates to intended or expected learning outcome – not the impact of the study. Please describe the specific focus of the article.

Improvement of Teaching Skills		**Personal Development**	
- Clinical Teaching		**Academic/ Career Development**	
- Small Group Teaching		**Educational Leadership**	
- Lecturing		**Organisational Development**	
- Feedback and Evaluation		**Teaching of Specific Content Areas**	
- Other		Please specify:	
Improvement of Research Skills			
Improvement of Administrative/ Management Skills		**Other (please specify): Education & support**	
Improvement of Computer Skills			

3. Context (Target Population)

Number of Subjects/ Size of Group:	
Country / Location of Study:	
Total Duration of Exposure: (Please specify number of hours/ activity and frequency of exposures).	
Level/ Stage:	
Profession:	

4. Aim/ Goal of the Study

	Stated	**Not Available**
Objective/ Purpose of Study:		
Specify Objective/ Purpose		
Tied to theoretical/ conceptual framework used		
Specify the theoretical/ conceptual framework used		
Based on relevant literature		
Specify whether the author demonstrates awareness of the literature		

5. Stated Intervention

- Intervention Type (This refers to overall design/ format of the intervention). Please check all that apply and use descriptors used by the author(s).

Workshop (specify duration)		
Short Course (specify duration)		
Seminar Series (specify duration)		
Longitudinal Program (e.g. Teaching Scholars Program)		
Fellowship (e.g. Teaching Scholars Program)		
Masters Program		
Certificate/ Diploma Course		
Computer-Based (e.g. Online; Distance Education)		
Mentorship Program		
Other (Please specify)		

- Instructional Methods (This refers to the instructional methods used with a particular program type). Please check all that apply and describe carefully.

Needs Assessment (i.e. was a needs assessment conducted prior to the intervention?)		
Didactic Teaching (e.g. Lecture)		
Small Group Discussions		
Case-Based Teaching		
Role Plays and Simulations		
Independent Learning/ Projects		
Written Materials and Readings		
Computer-Based Materials		
Coaching		
Other (Please specify)		

6. Impact of Intervention Studied

Code the level of impact studied in the item and summarize the results of the intervention at the appropriate level. Note: Include both predetermined and unintended outcomes. Please check all that apply. Use reverse side if necessary.

- Kirkpatrick Hierarchy

Level 1 Reaction: *covers participants' views on the learning experience, its organization, presentation, content, teaching methods, and aspects of the instructional organization, materials, quality of instruction (i.e. "happiness data")*
Results: REACTION: REACTION:
Level 2a: C*hange in attitudes – outcomes here relate to changes in the attitudes or perceptions among participant groups towards teaching and learning.*
Results: ATTITUDE :
Level 2b: *Modification of knowledge or skills – for knowledge, this relates to the acquisition of concepts, procedures and principles; for skills this relates to the acquisition of thinking/problem solving, psychomotor and social skills*
Results: SKILLS:
Level 3: *Behavioural change – documents the transfer of learning to the workplace or willingness of learners to apply new knowledge & skills.*
Results: BEHAVIOUR CHANGE:
Level 4a: *Change in organisational practice: wider changes in the organisation or delivery of care, attributable to an educational programme*
Results: CHANGE IN ORGANISATIONAL PRACTICE "

Level 4b: *Change among the participants' students, residents and colleagues – refers to improvement in student or resident learning/performance as a direct result of the educational intervention.*
Results:

7. Evaluation Methods

A: Study Design (Definitions are provided in Appendix A). Please provide as much information as possible.

Experimental Designs

Randomized controlled trial		Pre-test – Post-test	
		Post-test only	
		Delayed post-test(s)	
Cross-over series:			
Other and/or Comments:			

Quasi-Experimental Designs

Single group, no comparison		Pre-test – Post-test	
		Post-test only	
		Delayed post-test(s)	
Time series design		Interrupted	
		Equivalent	
Repeated measures			
Non-equivalent control group		Matched on key variables	
		External controls	
		Historical controls	
Other and/or Comments:			

Qualitative Studies

Grounded Theory	
Ethnography	
Narrative	
Other and/ or comments:	

Observational Studies

Mixed Methods (uses both qualitative and quantitative approaches; OR 2 qualitative methods OR 2 quantitative methods)

Literature Review

Meta-Analytic Studies

B: Data Collection Methods (If possible, please describe method and specific reliability & validity of measures used).

Questionnaire			
Interview			
Focus Group			
Observation			
	Videotape		
	Live		
	Other		
Expert Opinion			
CV search			
Student/ Learner outcomes (e.g. MCQ exam)			
Other (Please specify)			

C: Data Sources (Please indicate response rate).

Program participants		
Program Coordinators/ Faculty developers		
Colleagues & peers		
Students & residents		
Other (e.g. blinded observer)		

8. Study Quality

A: Please rate overall study quality

Low High

1	**2**	**3**	**4**	**5**

B: Please describe strengths and weaknesses of the study design, evaluation methods, study implementation and data analysis.

Strengths:

-

Weaknesses:

-

……

9. Strength of Findings

Please rate strength of findings using the following scale:

Low High

1	**2**	**3**	**4**	**5**

A.

1: No clear conclusions can be drawn. Not significant.
2: Results weak/ambiguous, but there appears to be a trend.
3: Conclusions can probably be based on the results.
4: Results are clear and very likely to be true.
5: Results are unequivocal.

B. Comments (Please include comments regarding generalizability, educational significance, etc.):

CONSIDERATIONS:

-

……

10. Avenues for Further Research (Highlighted by the article):

-

11. New "Insights"/Implications for <u>supporting student learning on placement</u> (Highlighted by the article):

-

12. Based on this article, do the methods of <u>supporting student learning on placement</u> make a difference?

-

13. Articles for further study. (Please identify articles not in database.)

-