

# The use of solution-oriented coaching to facilitate teacher's applications of education technology in a primary school

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### 1.1.3 Abbreviation of terms

AAC	Augmentative and alternative communication device
AT	Assistive Technology
App	Application
BPS	British Psychological Society
DfE	Department for Education
EEF	Education Endowment Foundation
EdTech	Education Technology
EPS	Educational Psychology Service
EP	Educational psychologist
IWB	Interactive Whiteboard
SEND	Special Educational Needs and Disabilities
TEP	Trainee Educational Psychologist

#### 1.1.4 Abstract

A vision for education redesigned with technology to equip pupils to succeed in the 21st century has been espoused internationally. Technology is reported to enhance learning outcomes, however, applications of technology in schools is varied and complex. This study sought to investigate how solution-oriented coaching could facilitate technology applications, with the aim of promoting teaching and learning.

There were two research questions. Firstly, how can a solution-oriented coaching framework be applied with a primary school setting to facilitate change with education technology? Secondly, how can a solution-oriented coaching framework help teachers to develop their knowledge, confidence, and skills in applying education technology? An action research solution-oriented framework was employed to capture the practicalities, challenges, and solutions around technology application. The research involved ten members of staff from a single form entry mainstream primary school. The staff were invited to participate in group and individual solution-oriented coaching sessions.

Self-ratings of knowledge, confidence, skills, and goals were taken before, during and after the coaching and were analysed to capture individual and group change. Data was also analysed using a SWOT framework (strengths, weaknesses, opportunities, and threats). The research suggested that solution-oriented coaching is a helpful and effective approach to facilitate change in teacher's confidence, knowledge, and applications of education technology. Limitations of the research are considered. Further research is needed to explore the influence of coaching on teacher's applications of technology and learning outcomes. Implications and recommendations for education technology policy, school improvement, and educational psychologists are offered.

Conclusions drawn emphasise that the solution-oriented coaching framework can be successful in creating change in education technology applications because it considers individual and systemic influences, and this in turn amplifies strengths

and the construction of personalised goals, implementation planning and solutions.

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## 2 Introduction

### 2.1.1 Focus of the research

The purpose of this study was to explore how solution-oriented coaching can facilitate applications of education technology in a mainstream primary school setting. The research utilised an action research solution-oriented coaching framework.

### 2.1.2 Personal and professional interest frame of reference

The author is completing a doctorate in applied educational psychology at the University of Nottingham and training placement with a Local Authority Educational Psychology Service (EPS) in the North West of England. Interest around technology developed through employment as a primary school teacher and computing subject leader over five years. This time included an exploration of how technology could be used to support teaching and learning. Later, whilst working as an assistant educational psychologist for one-year, observations were made of the variations between schools in the use of technology to facilitate learning and the difficulties encountered, including training for staff and costs around technology equipment.

### 2.1.3 Preliminary activities which contributed to the development of the research

To support the development of the research, views of education technology were invited from the local authority placement educational psychology service (see appendix A page 178). The respondents reported that they see technology used in educational settings, some EPs make recommendations around literacy software, some EPs are not aware of the evidence base around technology, and that the EPs are most interested in knowing how to work with schools to develop practice and technology implementation. A meeting then took place with a senior sensory technician and specialist teacher in the local authority to understand what is currently being used to support learners with technology (see research diary appendix B page 180 for further details). The specialist teacher reflected that schools vary in how they embrace technology, teacher confidence is important,

teachers need more training and can become particularly frustrated when the technology doesn't work. The specialist technician commented that school technicians vary in willingness to implement technology infrastructure, English schools do not have the equipment seen in other countries and that different technologies can support different sensory needs by supporting independence and learning. A meeting then took place with an education technology consultant who commented on the advantages of education technology enhancing the curriculum and reducing teacher workload. This was followed by a meeting with an EP to understand how their service provide support to schools around using iPads.

The outcome of these preliminary activities suggested that education technology is relevant for the work of educational psychologists. It also suggested that outside agencies such as, technicians, specialist teachers and consultants recognise both the opportunities and challenges school face when trying to implement education technology and a gap exists in the support needed for schools to create change in practice. Finally, it also suggested a helpful role for EPs in promoting evidenced based applications of technology. Together these activities raised the questions, how can EPs apply psychology to facilitate change in schools' education technology practices.

#### 2.1.4 Thesis structure

##### *3 Literature review*

The literature review first explores and defines education technology. The outcomes of educational technology are reviewed in the context of individual and organisational influences. The literature review concludes with a systematic review of the effectiveness of coaching as an intervention to facilitate change in teacher's applications of technology.

##### *5 Research aims, purposes and questions*

The aims and research questions are outlined. A rationale for solution-oriented coaching as a framework to facilitate change in education technology application is presented.

##### *6 Methodology*

This chapter includes a description of the qualitative methodology and action research as an appropriate design to explore the study's aims and research questions. A description of the research epistemological and ontological position is provided. This is followed by an account of the recruitment, solution-oriented coaching, analysis procedures and ethical protocols applied.

##### *7 Analysis and discussion*

The analysis is presented in chronological order of action. The findings are interpreted with caution in the context of wider influences and multiple explanations. The changes observed are discussed in the context of the aims of the research and research questions and literature. This is followed by a critical reflection of the research quality and limitations, and suggestions for future research are offered. The chapter concludes with implications for educational practitioners.

##### *8 Conclusions*

Conclusions drawn emphasise the positive influence of solution-oriented coaching on individual and organisational change in education technology applications.



### 3 Literature review

#### 3.1 Introduction to education technology context

Research informs us that some children and young people do not experience equality of educational outcomes (Education Endowment Foundation, 2018). This potential for educational outcome inequality has been exacerbated by the COVID-19 pandemic as pupils have experienced significant disruption to their learning and much more (DfE, 2021; DfE, 2022, EEF 2022, further details on the influence of Covid-19 school closures is presented in appendix C). The evaluation of what is known to make a difference in learning is arguably more important than ever before. Improving teaching and learning outcomes should involve an assessment of educational contexts and how children are taught (Hattie & Zierer, 2018). Education technology is arguably a key feature of the learning environment as a symbolic mediator and scaffold for teaching and learning (Kozulin, 2002; see section 3.2.2. page 26). Some authors go further and suggest that education needs to be redesigned with digital technology so that pupils are better equipped to succeed in the 21st century (Milton, 2015).

However, education professionals experience challenge around how education technology can be applied to enhance teaching and learning (Bower, 2017; EdTech Hub, 2021). While most schools increased their uses of education technology during and following COVID-19 school closures (DfE, 2022), there was variation in how schools responded with education technology (EEF, 2022). Gu, Crook, and Spector (2019) take an ecological perspective to suggest how researchers can approach the application and evaluation of education technology.

An ecological view involves an awareness of the different education processes, actors, and settings (Gu, Crook, & Spector, 2019). At the macro level, education policy and strategy, education technology markets, and research can inspire education technology adoption or avoidance (Gu, Crook, & Spector, 2019). Influences at the macro level can be seen internationally as governments promote the integration of education technology into educational settings with the aim of enhancing teaching and learning (United States Department for Education,

2017, p.3; World Economic Forum, 2016; the Department for International Development's EdTech research & innovation Hub, 2021). The Department for Education (2022) Opportunity for All white paper proposes the introduction of core technology standards that schools will be able to work towards by drawing upon a "strong evidence base for effective uses of technology" (DfE, 2022, p.59, see appendix D for an overview of the Education Technology Strategy in England). At the meso-layer, school leadership can mediate technology application through the school conditions they influence (Gu, Crook, & Spector, 2019). And finally, at the micro-layer, individual teachers may adopt technology to a different extent and in different ways (Gu, Crook, & Spector, 2019). To understand how technology can enhance teacher and learning, the literature review will critically review the interacting factors operating within and between the meso and micro layers. However, it is first important to consider what is meant by the term education technology.

### 3.1.1 What is education technology?

Education technology describes a broad range of material including equipment and software (see DfE, 2022, 'EdTechTools' database). It is arguably not surprising that the terms used in research are sometimes not clearly defined or do not have a theoretical basis (Passey, 2019). Foon Hew, Lan, Tang, Jia, and Kwan Lo (2019) completed an analysis of 503 empirical articles and reported that most studies did not reference theory, or that the description offered was vague. It is important to consider the theories underpinning definitions of education technology because they may take different assumptions about the process of learning, the role of the teacher and pupil, the nature of the learning task, social interaction, and the outcomes of learning (Bower, 2017; Ertmer & Newby, 2013; Kirschner & Hendrick, 2020; please see Appendix E for further detail around learning theory underpinning applications of technology).

According to Passey (2019) researchers can helpfully describe the context, framework, theory, and focus of the education technology research so that findings can be clearly understood. This is particularly important with regards to education technology because it is a continually evolving landscape, what is relevant today may not be relevant in five years as technology advances (Passey,

2019). Passey (2019) offers descriptions of education technology focus and theory. For example, Technology-Enhanced Management of Teaching (TEMT) describes the ways that technology is used to manage teaching approaches, such as how online environments can be used to support interactions in and out of school and online home learning (Passey, 2019). Whereas Technology-Enhanced Learning (TEL) describes the ways that technology is used to support cognition and metacognition, engagement, and externalisation of learning (Passey, 2019). In practice, this could involve an application whereby technology is used to enhance questioning through interactive assessment quizzes, or to create modelling that is more visual by drawing upon alternative forms of text, audio, or video to demonstrate learning. However, it could be argued some aspects of Passey's (2019) descriptors could overlap and may be used simultaneously. For example, a teacher may use an interactive whiteboard to model a concept with page replay (technology enhanced learning) while pupils map their ideas on an iPad (technology enhanced management of learning). Nonetheless, Passey (2019) offers a helpful description to specify the focus of education technology resource.

The Department for Education (2019) takes a broader definition of education technology as:

“the practice of using technology to support teaching and the effective day-to-day management of education institutions. It includes hardware (such as tablets, laptops or other digital devices), and digital resources, software and services that help aid teaching, meet specific needs, and help the daily running of education institutions.” (DfE, 2019, p.5).

In contrast, Bakhshaei, Hardy, Francisco, Noakes and Fusco (2017) define a “powerful use of technology” when teachers use technology to increase pupil agency so that they can select relevant tools to support their learning while also developing their skills in collaboration, communication, creativity, and critical thinking (Bakhshaei, Hardy, Francisco, Noakes & Fusco, 2017, pp.4-5). While the DfE (2019), offers a helpful broad definition of the potential roles and types of technology application it does not specify the theory underpinning the

applications. Bakshaei et al., (2017) in contrast provides helpful insights around how the technology can enhance agency.

The scope of this literature review does not include a focus on the deployment of technology to facilitate the daily running of school systems, such as, keeping attendance records, or the application of social media. The literature review also does not include a focus on the influence of 'screen time'. Systematic reviews suggest that there is not enough evidence to support the claim of a negative influence of 'screen time' on health and wellbeing (Stiglic & Viner, 2019; The Royal college of Paediatrics and Child Health, 2019). The focus of this literature review aligns with the DfE (2019), Bakshaei, Hardy, Francisco, Noakes and Fusco (2017) and Passey (2019) as it takes a broad definition of education technology as any application of software or device that aims to enhance teaching and learning.

The project here takes a transformative view of learning, where learning is understood to be a social, collaborative process that can be supported by technology (Milton, 2015) in combination with a variety of teaching strategies (Hattie, 2009). The following section will provide further detail around how technology can be applied effectively and review the reported influence of education technology on learning.

### 3.1.2 Education technology efficacy is complex

Education technology has been reported to improve learning outcomes, develop pupil skills in using technology to participate in society and the economy, support the curriculum, increase access to learning and support individual differences (Bower, 2017; ISTE, 2021; United States Department for Education, 2017, p.3; Partnership for 21<sup>st</sup> Century learning framework 2019). Speech, language, and communication AT interventions are suggestive of strong evidence of positive outcomes around independence, education, and quality of life (DfE, 2020, p.6). Positive outcomes while using education technology are also reported to extend beyond learning outcomes as research demonstrates improvements in pupil motivation and engagement (Squire, 2006). Newhouse (2015) suggest that education technology can promote motivation and productive learning because it

can increase agency and collaboration. Similarly, Johnson and Johnson (2009) also suggest positive effects of technology on cognitive, meta-cognitive, motivational, and social aspects of learning. There seems to be a converging view that some applications of educational technology can enhance pupil engagement and motivation and this in turn could positively influence learning outcomes. However, Bower (2017) notes caution should be taken around attributions of motivation to education technology alone because teaching and learning with technology involves many interacting individual and contextual influences which will be explored in more detail next.

The outcomes of technology can be dependent on how the technology is used and if it is planned effectively (The Education Endowment Foundation, 2019). Educational professionals are cautioned to avoid a deterministic assumption that technology will improve outcomes for CYP (Oliver, 2011). Researching the influence of education technology on learning outcomes is also complex and research methodology is sometimes criticised as it tries to capture the influence of education technology in the context of many factors (Bulfin, Henderson, Johnson, & Selwyn, 2014). Systematic reviews of technology provide a helpful source of evidence to evaluate the effectiveness of technology on learning outcomes (Lai & Bower, 2019; Olakanmi, Akcayir, Ishola & Epp, 2020).

Lewin, Smith, Morris, and Craig (2019) carried out a review of meta-analyses to summarise the effectiveness of educational technology on attainment outcomes. The review suggested that technology interventions around literacy typically create three months additional progress and a small to moderate effect is reported on maths progress (Lewin et al., 2019). The review also highlighted that the outcomes of technology use were influenced by the context, subject, content, pedagogy, teacher training, intervention length and implementation of the technology (Lewin et al., 2019, further detail around organisational considerations is presented in section 3.3.1). Caution must be taken with these findings however as the meta-analysis included both primary and secondary school participants and the effect size varied in different cases. Moreover, the review included a diverse range of technology devices and interventions.

Boon, Boon, and Bartle (2020) conducted a systematic review which focused specifically on iPad applications with 9- to 14-year-olds with the aim of understanding the effectiveness on academic outcomes. The authors reported mixed results of the effectiveness of the iPad applications (Boon, Boon, & Bartle, 2020, p.536). Some studies reported statistically significant influences on pupil outcomes and that iPads can promote collaboration, communication, and access to information (Boon, Boon, & Bartle, 2020, p.536). However, similarly to Lewin et al., (2019) the academic outcomes of using the iPad were influenced by the teacher's and pupils' competences in using the technology, how the iPad was used in the classroom and the teaching practices which were employed alongside the applications (Boon, Boon, & Bartle, 2020, p.536). It seems that the outcomes of education technology application are influenced by a range of individual and classroom factors, applications can therefore helpfully begin with a reflection around why and how it will be implemented (Clifford & Miles, 1998, p.184).

#### *3.1.2.1 A clear education technology pedagogical purpose*

Education policy and research highlight the importance of choosing technologies for their pedagogical purpose and effectiveness (Milton, 2015; Bower, 2017; Greenwood & Kew-Jones, 2016; DfE, 2022). It is believed that children learn best when they are cognitively active and engaged, learning is meaningful, appropriately scaffolded, and socially interactive (Hirsh-Pasek et al., 2015). Learning environments can mediate the learning process through modelling, feedback, scaffolding, self-explanation, real life learning and distributed practice (Hattie, 2009; Lauchlan & Carrigan, 2013). Effective education technology application takes a transformative view of learning, where learning is understood to be a social, collaborative process that can be supported by technology (Milton, 2015) in combination with a variety of teaching strategies (Hattie, 2009).

The design features of some technologies can help children to learn when they adapt the level of difficulty, vary in visual and audio presentation, give feedback about performance, provide opportunities to repeat problems previously solved incorrectly, distributed practice, and interleaved learning (Bower, 2017; Crompton, Bernacki & Greene, 2020). Mediation and collaboration in and beyond

the classroom can also take place through multimedia presentations and podcasts (Darling-Hammond, Zieleski & Goldman, 2014), video conferencing and websites (Bower, Kenney, Dalgarno, Lee, & Kennedy, 2014; Oblinger, 2012). Applications of education technology should involve a reflection around how it is going to be applied to enhance the teaching and learning process rather than simply replicate an existing practice (Gu, Crook, & Spector, 2019, p.1118). However, this should also include consideration of the developmental and individual needs of pupils.

### *3.1.2.2 A personalised approach to developmental and individual needs*

Education policy promotes the principles of inclusive practice and removal of barriers to learning (DfE, 2015). Examples of this are seen with assistive technologies which can be used to support pupils with special educational needs (Newhouse, 2015) and pupils who are learning English as an additional language (EAL) (Teng, 2019; Bailey & Snowden 2021; The Bell Foundation, 2022). Deunk, Smale-Jacobse, de Boer Doolgaard & Bosker (2018) carried out a systematic review and meta-analysis of the effect of differentiation strategies on primary school pupils' language and maths outcomes. The authors found that differentiation with education technology enhanced learning outcomes through assessments of progress and curriculum content matched to pupils' learning needs (Deunk, Smale-Jacobse, de Boer Doolgaard & Bosker, 2018). Bailey and Snowden (2021) captured strategies used by five teachers teaching literacy with pupils who were learning EAL. Although this study includes a small sample of teachers, the authors found that only one teacher used educational technology to support the pupils and that this was useful to support fluency in English (Bailey & Snowden, 2021). The authors suggest that this education technology practice could be used in the future to provide effective support when the pupils come across increasingly complex language (Bailey & Snowden, 2021). This research highlights effective application of technology has a clear purpose; however, it also highlights variation in teacher's practice which has potential implications for pupil's learning opportunities.

Education technology can enhance learning when pupil's individual needs are considered. Research reports that there are individual differences in pupil

competences in using technology and this is sometimes reported to be a barrier to effective applications (Bailey & Snowden, 2021; Boon, Boon & Bartle. 2020; DfE, 2021). It is therefore inaccurate to assume that pupils' have similar digital fluencies (Miller & Bartlett, 2012). Teachers also need to consider the developmental needs of their learners. According to Parish-Morris, Mahajan, Hirsh-Pasek, Michnick and Fuller Collins (2013) effective uses of technology with younger children requires a shared experience with an adult. This section has considered how effective applications of education technology require consideration around the educational context, pedagogical purpose, and the developmental and individual needs of learners.

### 3.1.3 Summary

In this section, a definition of education technology was presented. This was followed by a critical review of when education technology is used effectively. While there are reported positive outcomes of education technology, this is influenced by several individual and contextual factors. Education policy and research highlight the importance of choosing technologies for their pedagogical purpose and effectiveness (DfE, 2022). The literature review will next consider how education technology can be applied in and is mediated by the school context in more detail (Bower, 2017, p.38).



## 3.2 Education technology application in school contexts

### 3.2.1 Organisational barriers to education technology implementation

Reported organisational barriers to technology use include time constraints, cost, limited knowledge of technology, access, and organisational issues (Koehler & Mishra, 2013; Milton, 2015; EEF, 2019). The Department for Education (2021) survey of 897 headteachers and 804 teachers across England reported that schools varied in the range of devices used and the ratio of devices to pupils. Assistive technology was most frequently used, with most using interactive whiteboards, most primary schools using tablets and most high schools using laptops and more likely to use learner analytics (DfE, 2021b). The survey reported that financial barriers were perceived as one of the biggest barriers along with the age and compatibility of software (DfE, 2021b). Small barriers to technology use included connectivity, safeguarding and data concerns (DfE, 2021b). Teachers reported the availability of technology in pupils' homes and internet connectivity as a major barrier (DfE, 2021b). The survey also highlighted that a large proportion of schools did not have an EdTech strategy in place (primary 62%) and there is an opportunity for further guidance and support around the strategic development of education technology (DfE, 2021b). While organisational barriers around technology are important, teachers also play a key role in the adoption of education technology practice; their perceptions and uses of education technology will be explored in detail next.

### 3.2.2 Teacher uses and perceptions of education technology

Applications of education technology involves teacher's beliefs about learning, technology, collaboration with colleagues and reflection (Tondeur, Scherer, Baran, Siddiq, Valtonen & Sointu 2019). Teachers hold unique and varied perceptions and experience using education technology (Bailey and Snowden, 2021). Teacher confidence, agency and lack of training is reported as the most common barrier to using technology (British Educational Suppliers Association EdTech survey, 2018; Strawbridge, Walker, Voce, Jenkins, Barrand, Hollinshed, Craik, Latif, Sherman, & Brown, 2018). Education policy proposes that teacher's knowledge, skills, and confidence in using technology should be supported (DfE,

2019; ISTE, 2021). Most Head teacher and teacher respondents to the Ed Tech survey reported that technology had or could improve pupil outcomes (DfE, 2021). However, the survey reported teachers' skills and confidence (9 out of 10 head teachers and three-fifths of teachers) as barriers to technology application (DfE, 2021b). Interestingly, perceptions of education technology were lower for older teachers and those with more experience (DfE, 2021b).

The Technology Acceptance Model (TAM) attempts to explain factors underpinning teachers' intentions and uses of technology and this includes perceived usefulness, ease of use and attitudes, self-efficacy, subjective norms and facilitating conditions, and individual differences such as, age and teaching experience (Scherer, Siddiq & Tondeur, 2019). The DfE (2021b) survey corresponds with this model as teachers with perceived low confidence and skills were less likely to report that education technology met their needs, saved them time, and reduced their workload (DfE, 2021b). To enhance teachers' positive perceptions and self-efficacy towards education technology, effective professional development therefore needs to be matched carefully to individual skills, background and experiences and provide autonomy.

Koehler and Mishra (2009) developed a framework titled Technological Pedagogical Content Knowledge (TPACK) to support teacher development with technology. The framework explains that each teacher needs a personalised understanding of the factors that interact with technology, teaching, and the curriculum to be able to use technology effectively (Koehler & Mishra, 2006, p.1029). While the TPACK model provides a conceptual framework to understand what teachers need to know to use technology effectively, it does not explain how teachers can achieve this knowledge and the process this involves. While McGrath, Karabas and Willis (2011) employed a small sample of teachers, they reported that the TPACK training moved too quickly for some teachers, and it presented 'what' information rather than opportunities to practice how technology could be used. One teacher reported a 'mismatch' in the training and that they needed to collaborate with colleagues (McGrath, Karabas & Willis, 2011, p.17). Educational technology professional development for teachers should therefore consider the individual differences in teachers' skills in using technology and

opportunities for collaboration with colleagues. Gu, Crook, and Spector (2019) suggest further research is needed around interactions between teachers and the extent to which this could influence applications of education technology. While McConnell, Parker, Eberhardt, Koehler and Lundeberg (2012) found variation in teachers' confidence in using technology, they also found that confident teachers provided support to less confident teachers. Facilitating change with education technology therefore requires an individual, interpersonal, and organisational perspective to consider the interacting influences between teachers and the school context.

### 3.2.3 Models of organisational change

While it is not possible to review the organisational change literature in detail here, this section will offer some theoretical perspectives around how and why change interventions may lead to limited success, as well as possible frameworks to create and enhance change. There is some agreement in the literature that bringing about organisational change can be difficult, but there is divergence with regards to conceptualising change, where it comes from, how and why it takes place and if the change outcomes involve processes, content, and/or people. Perspectives of change have also shifted over time and has included teleological, life cycle, evolution, dialectic, and cultural theories of change (Van De Ven & Poole, 2004). One possible way of classifying models of change includes theories of planned or emergent change. First, a foundational, linear, planned model of change developed by Lewin (1942) is outlined. This is complemented with a continuous model of change and the influence of culture. The section concludes with applications of organisational change theory around educational technology implementation.

Traditionally, organisational change has been viewed from a planned change conceptualisation whereby change is initiated by leadership and is planned through interventions (Beycioglu & Kondakci, 2021). Planned models of organisational change aim to create change through top-down, participative, sequenced steps. Lewin's (1942) field theory is a well-known planned model of change and argues that behaviour emerges from the totality of forces around a

person or group, and for this reason is it important to consider the situation. Lewin (1942) conceptualised change as a gradual process of iteration and clarification in the three-step model presented in figure 1 page 29. However, the model has been criticised for its oversimplicity, limited application to small projects alone and that it overlooks organisational influences such as power, culture, and politics (Burnes, 2004; Burnes, 2005). McAleese, Creed, and Ambika (2013) highlight that field theory of change was part of a bigger piece of work and that change can be understood by also drawing upon Lewin’s (1951) theory of group dynamics and action research. Successful change from a planned theory of change involves collaborative and participatory group processes (Burnes, 2004). According to Lewin’s (1951) group dynamics theory, groups are interdependent, and it is important to bring people together to contribute to decision making because this can positively influence their thoughts and behaviour about the change (Burnes, 2004). Action research is one planned change approach that offers a framework to facilitate change by evoking commitment to change, helping groups to act and identify solutions (Burnes, 2004).

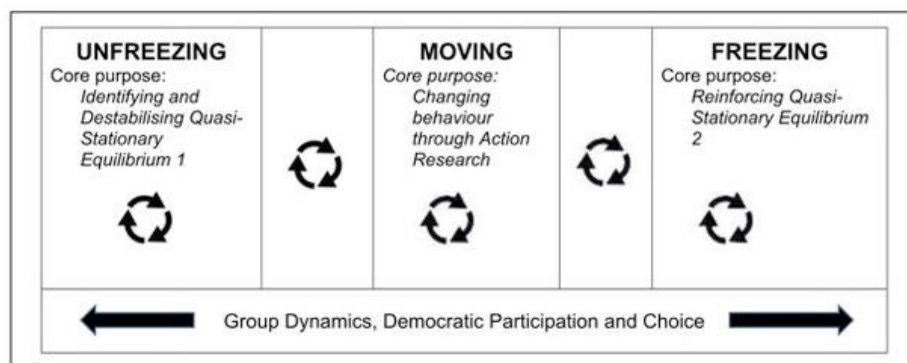


Figure 1 “A field theory-based view of Lewin’s three-step model” taken from Burnes (2020, p.49)

However, thinking around organisational change has progressed since Lewin’s (1942) field theory, and includes emergent models of change where change is understood as continuous and non-linear (Burnes, 2005). This perspective in contrast suggests that with bottom-up process, which interact with leadership, schools can be guided towards dynamic, incremental, punctuated, or continuous

change (Beycioglu & Kondakci, 2021). Organisational change is unsuccessful in the context of top-down change because the change is created and implemented by leaders who are not closely connected to the focus of change. A continuous change perspective suggests that in the context of a nurturing culture, all practitioners can create plans and that this process enhances openness, readiness, and commitment and in turn positive change (Beycioglu & Kondakci, 2021). However, this perspective could be criticised on the grounds that it does not clearly specify the interactions that could take place between planned and continuous change and this theory is currently not underpinned by a robust evidence base (Beycioglu & Kondakci, 2021). Complexity theories of emergent change in particular are also criticised in terms of the challenges in applying a theory developed from natural sciences to social situations (Burnes, 2005). Nonetheless, the perspective of continuous change offers a helpful bottom-up way of working with schools that recognises the complex, non-linear and dynamic nature of change. The review turns next to explore perspectives which offer explanations around the influence of culture on school effectiveness and change.

School improvement research assumes that schools have the capacity to improve and that schools can improve when they create tailored approaches to their unique needs (Harris, 2002, p.4). It is important consider the organisational culture of a school because this can influence how people behave and in turn school improvement and effectiveness (Schein, 1990; Harris, 2002; Zhu, 2015). Schein (1990) describes culture as a dynamic process of shared norms, beliefs, values, and assumptions around working, and that this leads to automatic patterns of perceiving, thinking, and acting. Zhu (2015) goes further and highlights that school cultures are open to the influence of wider historical and social developments. According to Harris (2002) collaborative school cultures create the necessary conditions and relationships for change because colleagues trust each other, they support each other's ideas and this in turn facilitates further participation, sharing and innovation (Harris, 2002, p.13). Organisational culture is important with regards to the adoption and application of education technology because supportive and innovative cultures facilitate risk taking among teachers to learn new practices, whereas teachers working within closed cultures without support are more likely to oppose change (Zhu, 2015). Zhu (2015) carried out a

survey of six universities' organisational culture. The author measured organisational cultures as "...goal orientation, innovation orientation, participation in decision making, structured leadership, supportive leadership, shared vision, and formal relationships." (Zhu, 2015, p.68). In total 684 teachers reported positive views around education technology and importantly the perception that implementation of technology is challenging (Zhu, 2015). The findings suggested that the implementation of technology was strongly predicted by the universities' goal orientation, innovation orientation, formal relationship among members and structured leadership (Zhu, 2015). Universities with a high innovative orientation and collaborative practices were more likely to implement technology, whereas universities with low innovative orientations were less likely to implement technology (Zhu, 2015). While there are individual differences in teachers' perceptions and practices with technology, this research helpfully highlights that teachers' education technology practices can be positively or negatively influenced by the organisational culture. This raises the question how schools can change to develop cultures with innovative and collaborative orientations, particularly when groups may engage in defensive actions.

Defensive organisational actions that can impact negatively on education technology implementation were captured by Divaharan and Cher Ping (2010) in three secondary schools. Through the application of activity theory, the authors identified three levels of activity systems that can influence the effectiveness of education technology implementation (Divaraharan & Cher Ping, 2010). This included the classroom activity system, the department activity system, and the school activity system (Divaharan & Cher Ping, 2010). In school 'A' there were clear goals around education technology and teacher's had access to technical support, and reassurance from colleagues. However, the authors reported that the teachers did not see technology integration as important because the school principal did not lead on the school improvement aim. Adding to this, it was reported that the teachers did not understand expectations or share resources around technology, and this negatively influenced the department activity system. School 'C' had limited technology resources and infrastructure and pupils were not practiced in using the technology resources. There was no sharing culture within departments or clear school wide goals towards technology. Teachers also

did not have technical support, and this negatively influenced the adoption of technology. In contrast, in school 'B' teachers were aware of the school's expectations around education technology and there were department sharing sessions to support and develop teacher's practices with technology. In school B the principal was also reported to carry out a 'visible role' in the implementation of education technology. Divaharan and Cher Ping (2010) highlight the importance of strong cultures of sharing and support. The authors argue that schools need to function as learning organisations to facilitate change with technology through a curriculum focus, leadership involvement, infrastructure, and implementation processes (Divaharan & Cher Ping, 2010).

It is important to note the findings from Divaharan and Cher Ping (2010) are limited by the small sample size of three secondary schools and influence of the wider social, political, and cultural influences in Singapore. There are also some criticisms of the concept of schools as learning organisations because there is no agreement around the definition of what makes a school a learning organisation and the research quality is criticised (Lewin, 2019). Despite the limitations of Divaharan and Cher Ping's (2010) study, the International Society for Technology in Education (2021) describe essential conditions to 'leverage' technology for learning and they report similar organisational conditions found by Divaharan and Cher Ping (2010). The ISTE (2021) suggest that schools need a shared vision, empowered leaders, implementation planning, consistent and adequate funding, equitable access, skilled personnel, ongoing professional learning, technical support, curriculum framework, student-centred learning assessment and evaluation, engaged communities, policies, and supportive external context. Again, this raises the question how can schools improve to develop essential organisational conditions to implement technology?

In pursuit of the question "how best to effect change?" in schools Rees (2017) created a systemic solution-oriented model (Rees, 2017, p.217). Rees' (2017) systemic solution-oriented model aimed to identify successful methods, systems, and interactions so that they can be replicated (Rees, 2017). Solution-oriented practice emerged from the solution focused approach, and it is an inclusive, humanistic, and flexible approach (Rees, 2017, p.225). In contrast to a purely

solution-focused approach, a solution-oriented model embraces “pain and possibility” and keeps “one foot in pain and one in possibility” (Rees, 2017, p.227). Rees (2017) argues that pain is included in conversations about change because it is important to acknowledge and validate the pain and it could also be important during the change process to identify solutions (Rees, 2017, p.218). Rees’ (2017) solution-oriented organisational change process first involves a clear vision of what the organisation is wanting to achieve, this is followed by an exploration around how this will happen. Finally, this involves developing hard systems and soft systems to enable change. In the case of educational technology school improvement this could include hard systems such as, technology resources and soft systems such as, how teachers work together to organise resources and share practices. Together, hard, and soft systems enable the organisation to achieve the vision (Rees, 2017). This systemic solution-oriented model arguably offers a strength based and comprehensive approach to facilitate systemic change. It could be argued that the planned steps in this model could facilitate some of the essential successful education conditions including creating a shared vision, collaboration, innovative goal orientation culture, empowered leaders, implementation planning, and engaged communities (Divaharan & Cher Ping, 2010; Zhu, 2015; ISTE, 2021). The model also acknowledges the bottom-up, continuous change opportunities for all teachers to draw upon their unique strengths and solutions in creating change. However, it is important to note that this model has not been evaluated in peer reviewed journals. Although case studies are provided on the solution-oriented school (SYCOL) program which provide a description of the program and context, it does not provide evaluative information around how and to what extent the program facilitated change (SYCOL, 2022).

#### 3.2.4 Summary

Teacher confidence, knowledge, skills, and perceptions of education technology is a consistently reported factor to influence education technology use. Concepts of school culture (Schein, 1990; Harris, 2002; Zhu, 2015), defensive actions and multiple activity systems (Divaharan & Cher Ping’s, 2010) provide helpful insights into organisational factors which may facilitate education technology application. Field theory, group dynamics and action research offer a useful perspective



around the importance of teacher participation and collaboration (Lewin 1951; Burnes, 2004; Burnes, 2020). Converging evidence highlights organisational barriers and essential conditions to technology include implementation, time, leadership, culture teacher perceptions and support (ISTE, 2021). Applications of education technology is influenced by an interaction between individual, interpersonal and educational context factors. Rees' (2017) solution-oriented model was outlined as a potentially helpful framework to facilitate organisational change. With both organisational and individual factors that can influence education technology applications, this raises the question what methods can facilitate change which considers individual, interpersonal, and organisational influences. In the next section coaching will be explored as method to facilitate change that considers these three levels.

### 3.3 Coaching education technology school improvement

#### 3.3.1 What is coaching?

Coaching is a conversational helping process often on a one-to-one basis which aims to achieve positive behavioural change (Passmore & Lai, 2010). The purpose of coaching is to facilitate professional learning through a collaborative coaching conversation and professional relationship between a 'coach' and 'coachee' (Adams, 2016; Elek & Page, 2019). It has diverse and widespread application and originated in sport (BPS, 2022; NHS, Leadership Centre, Research into Leadership Series, 2005). It is important to define coaching clearly if coaching is going to contribute to evidenced based practice and so that coaches and coachees expectations of the process and outcomes are clearly understood. Adams (2016) helpfully explains that,

“Coaching is a way of working with people that focuses on supporting them to improve their performance, learn and develop, and/or experience greater wellbeing.” (Adams, 2016, p5).

While sub-sections of coaching such as, executive coaching, life coaching and sports coaching definitions vary slightly, most definitions of coaching emphasise that coaching is about facilitating an individual's personal and/or professional development (Passmore & Lai, 2019, p14). The International Coaching Federation (2022) defines coaching as,

“partnering with clients in a thought-provoking and creative process that inspires them to maximize their personal and professional potential.” (The International Coaching Federation, 2022).

Core coaching competencies include rapport building; active listening; attending to the coaching content and process; taking a curious and encouraging approach; paraphrasing and reflecting; asking probing questions; noticing limiting beliefs; drawing attention to opportunities; and giving and receiving feedback (Adams, 2016). Further details of coach competencies and ethical codes are described in the International Coach Federation's (ICF) Core Competencies (2022) and ICF code of ethics (2021). In a survey of 1266 coaches in 79 countries, 1 in 20 survey

respondents were also psychologists (Passmore, 2021). Coaching competencies arguably align with the BPS (2021) code of ethics and conduct and the Health and Care Professions Council (2015) psychologist standards of proficiency.

Coaching psychology involves the application of intrapersonal, interpersonal, and systemic psychology during the coaching process (Passmore & Lai, 2019). Palmer and Cavanagh (2006) argue that coaching psychologists bring depth to coaching through the application of psychological theory (see Table 1 page 38). Coaching is reported to be founded on positive psychology, social psychology, cognitive-behavioural psychology, solution focused principles, adult learning theory and organisational development (Adams, 2016; Bachkirova, Cox & Clutterbuck, 2010; Palmer & Cavanagh, 2006). This means that several psychological theories can be applied to coaching, and it is not possible to include all or describe each in detail here. A selection of theory is taken from Adams (2016) coaching psychology in schools and is presented in table 1 on page 38. Table 1 explains how psychological theory can facilitate and explain the cognitive, emotional, and behavioural change often observed during and following coaching. In summary, change takes place by raising an individual's motivation and agency towards goals (Adams, 2016,p.14).

While coaching is reported to be a growing practice (BPS, 2022), there are two primary contentions surrounding the coaching the profession. The first contention is that coaching is an unregulated profession (the British Psychological Society, 2022). In response to this, the BPS (2022) formed a special group in coaching psychology and report that they are developing a professionally recognised chartership in coaching psychology. Coaching specific professional membership exists internationally and includes the International Society for Coaching Psychology, International Coaching Federation, European Mentoring and Coaching Council and the Association of coaching.

The second contention includes a debate about coaching's core features and the conceptual similarities it holds with other helping relationships. Since the essential purpose of coaching is to help people achieve positive change it is not surprising that the coaching process also has some overlap with other

approaches to helping. It is not possible to review approaches to helping in detail here, but this section will describe three helping approaches including, counselling, mentoring and consultation to explore these similarities before the core features of coaching are outlined. Counselling is defined by Kaplan, Tarvydas and Gladding (2014) as a “professional relationship that is meant to empower diverse individuals throughout the life span to live meaningful and healthy lives.” (Kaplan, Tarvydas, & Gladding, 2014, p370). Of course, there are similarities to coaching as counselling takes place through conversation and aims to achieve positive change for individuals. However, counselling is distinct from coaching because it typically explores problems and ways to cope and understand the past to enhance general wellbeing (Passmore & Lai, 2019). Coaching in contrast involves a contracted and agreed focus on an individual’s preferred specific goals for the future, rather than enhancing wellbeing overall.

Mentoring is another helping relationship which it could be argued holds some similarities to coaching. Mentoring is defined as an open-ended professional relationship where a more experienced or senior colleague gives guidance and advice (Hussey & Campbell-Meier, 2021). Mentoring typically involves working towards long-term goals regarding career development and this process usually takes place over a long period of time from months to years (Passmore & Lai, 2019). In contrast to this directive approach, during the coaching process a psychologist coach collaborates with a coachee in a non-hierarchical relationship. The psychologist coach also negotiates a timeline for the coaching process and uses questioning and reflecting back so that the coachee can identify specific goals and a plan to achieve these.

The final helping relationship to be compared with coaching is consultation. Similarly, to coaching, consultation in an EPS context involves a non-hierarchical, conversation which aims to reconnect and enhance the skills and understanding of individuals through a collaborative problem-solving process (Wagner, 2000). Similarly, to coaching, psychologists typically draw upon a particular framework to facilitate the consultation. It could be argued that coaching diverges from consultation because consultation typically involves a conversation around a problem and assumes that individual’s views of a situation are restricted, and that

through the consultation process they can be supported to develop an interactionist view of a situation (Wagner, 2000). Whereas coaching conversations are typically focused on the future and constructing a plan that will help the individual to achieve specific preferred goals. However, it is recognised that there are similarities in both the helping conversation process and professional skills coaches draw upon, particularly in consultation and counselling which includes active listening, thoughtful questioning, and collaboration. The core and essential features of coaching outlined in this section included: the coaching process is structured through the application of a coaching framework in a short-term negotiated process, the coach aims to enhance the coachees self-awareness, self-efficacy and pursuit of specific goals, the coach has skills in facilitating the coaching process but not the focus of the coaching subject or outcome, the focus is on the present and the future, and authentic optimism and positive regard is conveyed to coachees (Passmore & Lai, 2019).

Table 1 a summary of psychological theory applied to coaching, adapted from Adams (2016) chapter 5 'psychology in coaching' p.38

<b>Theory</b>	<b>Description and application to coaching</b>
Collaborative alliance (Adams, 2016)	A non-hierarchical, person-centred approach to a helping conversation. Individual's skills and experience are valued and respected. The coach demonstrates active listening and accepts the coachee's perspective without judgement. The coach responds to the coachee's needs.
Ryan and Deci (2000) Self-determination	Motivation involves energy, persistence, and intention. People are motivated by different factors. People will attempt challenges and learn when they feel competent, autonomous, and connected with others. This is described as intrinsic motivation. External pressures can negatively influence this. The coach does not direct the coachee's decision making. The coach may pose questions or invite the coachee to consider a resource, strategy, or connection with a colleague to achieve their desired goals.
Cognitive-behaviour coaching (Grant, 2014)	Behavioural change involves challenging the potential thinking errors, all or nothing thinking, personalisation or catastrophising thoughts individuals might hold. A coach can gently reflect back and ask questions which help the coachee to notice thoughts which could be influencing their progress towards their goals. The aim is that the coachee will develop balanced and flexible thoughts around a situation.
Bandura (1977) self-efficacy theory of behavioural change	Perseverance towards a goal is influenced by the extent to which an individual believes they can achieve their goal. Implying that if an individual holds strong self-efficacy beliefs they are more likely to demonstrate behaviour towards a goal. A coach can support self-efficacy beliefs by inviting reflections on the coachee's confidence and

	drawing their attention to and encouraging reflection around their skills and success.
Stages of change model (DiClemente & Prochaska, 1998)	Behavioural change moves from precontemplation, contemplation, preparation, action, maintenance, and relapse stages. Coaching is matched to where the person is on the change model. Through conversation the coach tries to understand if the coachee is aware, wants, feels confident, has the capacity or support to change. This theory assumes that change is unlikely without bringing the coachees awareness to their motivations, confidence, skills, and support.
Motivational interviewing (MI) (Rollnick, Kaplan & Rutschman, 2016)	MI is a set of skills applied in constructive conversation that empowers individuals to discuss what they want to change, and this helps them to reduce ambivalence towards the change. The coach clarifies with the coachee how they will go about the change to strengthen their commitment to act and gives specific, accurate and positive feedback.

### 3.3.2 Models of coaching

Coaching can take place in person (Grant, 2014), through an online video call (Matsumura, Correnti, Walsh, DiPrima Bickel & Zook-Howell, 2019), on an individual or group basis. Passmore (2021) reported that almost all coaches used online coaching during the COVID-19 pandemic 2019-2021 and 85% expressed a preference for this format in the future. The respondents also reported that team coaching in organisations is growing (Passmore, 2021). Clutterbuck (2010) defines team coaching as, “a learning intervention designed to increase collective capability and performance of a group or team, through application of the coaching principles of assisted reflection, analysis and motivation for change” (Cox, Bachirova & Cluttebruck, 2010, p.271). Cooperation during a team coaching process can be facilitated by agreeing goals of the group and ground rules for working together (Whitmore, 2002).

There are several coaching frameworks available (Cox, Bachkirova & Clutterbuck, 2010). Coaching models must be applied carefully so that there is a balance between following a structure with integrity to focus the conversation on change, while also applying the model in a way that responds to the conversation and needs of the coachee (Green & Grant, 2003; Adams, 2016, p.36). Instructional coaching aims to facilitate the professional development of teachers with a focus on improving teaching practice which could include goals around classroom management, the curriculum and assessment (Ehsanipour & Zaccarelli, 2017; Kraft, Blazar & Hogan, 2018). Whereas cognitive behaviour coaching aims to support the coachee's thinking such that they notice the relationships between their thoughts, feelings and behaviour and develop patterns of thinking that enable them to achieve their goals (Grant, 2014). According to Wang, Lai, Xu and McDowall (2022) no one coaching framework is particularly effective in shaping positive outcomes. The authors suggest that a combination of approaches may be needed (Wang, Lai, Xu, & McDowall, 2022). Solution focused coaching (SFC) is a flexible model that can be combined with other approaches and will be reviewed in more detail next (Grant, Green & Rynsaardt, 2010).

### 3.3.3 Solution focused coaching

Solution focused coaching (SFC) was developed from solution focused brief therapy (SFBT) (de Shazer & Berg, 1997). SFBT emerged deductively from trying to find "what difference made a difference" and the authors found solution talk to be effective in creating positive change (de Shazer & Berg, 1997, p.121). The purpose of SFC is to facilitate two types of change, 'new viewing and new doing' (Cavanagh & Grant, 2010, p.57). This means firstly helping people to change how they view the situation and secondly developing actions that will enable them to pursue their goals (Cavanagh & Grant, 2010, p.57). Harker, Dean and Monsen (2017) suggest that change can happen in a short period of time because individuals can tell their story and move towards personalised problem solving (Harker, Dean & Monsen, 2017, p.171). SFC can empower the coachee towards self-directed learning by enhancing their beliefs in their capacity to create and act on personal solutions towards a preferred future (Grant & Cavanagh, 2010). To



help the coachee self-regulate towards their goals the coach asks questions which promotes, “a curious, experiential, and experimental mindset” (Grant & Cavanagh, 2010, p.57).

The principles underpinning SF practice are presented in Figure 1.1 page 42. SFC is a strengths-based approach that empowers the coachee to reflect and describe what they want in the future and move towards these goals by drawing upon their existing success, strengths, and skills (Cavanagh & Grant, 2010; O’Connell & Palmer, 2018). It is underpinned by a constructivist epistemology which emphasises that solutions are built through language, the focus of the conversation therefore involves a detailed description of the preferred future and exception finding (Cavanagh & Grant, 2010, p.55). Conversational tools include the miracle question, scaling, highlighting resources and reframing to expose possibilities (Cavanagh & Grant, 2010). Rees (2001) reports that scaling can provide hope as the conversation focuses on progress and change (Rees, 2001, p.208). Through the processes of sensitisation and amplification, the coach reminds and increases awareness of their resources and strengths and amplifies when things are working well (Cavanagh & Grant, 2010; Harker, Dean & Monsen, 2017). The aim of using these tools is to gently shift individuals from seeing and talking about the problem to seeing and talking about the solutions (O’Connell & Palmer, 2018). Solution focused dialogue is effective in reconnecting people with their own resources (Harker, Dean & Monsen, 2017). Children, teachers, and schools are best placed to identify the solutions and resources that will help, and solution-focused conversation can facilitate this (Rees, 2001).

SFC takes place within the context of a collaborative relationship where the coach values the knowledge and skills of individuals and assumes that individuals can and are best placed to identify the solutions that will work for them (Cavanagh & Grant, 2010; O’Connell & Palmer, 2018). The framework for SFC is flexible and has been successfully combined with cognitive behaviour coaching (Grant, Green & Rynsaardt, 2010). With regards to SFBT, de Shazer and Berg (1997) suggest that four characteristics outline the approach including: the ‘miracle question’, scaling, a break and compliments or homework (de Shazer & Berg,

1997, p.123). O’Connell and Palmer (2018) suggest it is the values underpinning the process that make the approach solution focused.



Figure 1.1 Principles underpinning solution focused coaching

Solution focused coaching frameworks include the Goal, Reality, Options, Will (GROW) model (Whitmore, 2002), ‘Working On What Works’ (WOWWW) coaching programme (Berg & Shilts, 2005) and ‘Solution’ and ‘Focus’ (Williams, Palmer & O’Connell, 2011). Williams, Palmer and O’Connell (2011) developed the ‘SOLUTION’ framework describes the overall SFC process which includes: Share updates, Observe interests, Listen to hopes and goals, Understand exceptions, Tap potential, Imagine success, Own outcomes and Note contributions. At the end of a solution focused conversation, individuals sometimes take a summary of the conversation or pictures to remind them of their solutions and strengths (Rees, 2001, p.210).

Limitations of solution focused approaches include that they are not appropriate in the context of child protection procedures or when working with younger children, individuals with language or learning difficulties (Brown, Powell, & Clarke, 2012; Simmonds, 2019). SFC cannot be used to facilitate change to all issues and real-life coaching is not completely solution focused (de Shazer & Berg, 1997, p.122; Grant & Gerrard, 2020). Having defined what is meant by coaching and the models available, the review will now outline the outcomes reported in coaching research.

### 3.3.4 The outcomes of coaching

Positive outcomes of solution-oriented coaching include teacher wellbeing, decreased stress, increased self-efficacy, goal attainment and readiness to change (Grant, Green & Rynsaardt, 2010; Ellis, 2013; Grant, 2012; Grant, 2014). Brown, Powell, and Clark (2012) reported positive outcomes of the Working on What Works programme on classroom relationships, behaviour, and respect. Evaluations of problem and solution focused questioning suggests that solution focused questioning leads to greater goal attainment, self-efficacy and affect than problem focused or combined problem and solution focused questions (Grant & Gerrard, 2020). Problem focused questions are reported to decrease affect for individuals with low dysfunctional attitudes (Grant & Gerrard, 2020). However, there is a debate in coaching research around how to measure outcomes because of the complexities of trying to understand the influence of coaching on change in the context of other individual and contextual interacting factors (Grant, 2014; Grant & Gerrard, 2020).

There are few studies which evaluate the long-term influence of coaching on outcomes in schools (Nieuwerburgh & Barr, 2016) and more research is needed around why and in what contexts coaching is effective (Elek & Page, 2019). The efficacy of coaching can be measured by progress and attainment of goals (Grant & O'Connor, 2018, p.14). Broader outcomes of coaching evaluation include affect (attitudes, motivation), cognition (self-reflection, awareness, perceptions of efficacy and planning), goal attainment, changes in behaviour, positive relationships, and wellbeing (Wang, Lai, Xu & McDowall, 2022). Elek and Page

(2019) suggest that the duration of coaching should be matched to the context and outcomes sought. Ellis (2013) reported that contextual factors can threaten competence, autonomy, and relatedness and this in turn can negatively influence the coaching process (Ellis, 2013, p.52). Participant teachers in Ellis' (2013) study reported pressures regarding 'results' in learning and the 'one off' coaching sessions made it difficult to measure outcomes or follow up. Coaching is therefore unlikely to be successful in facilitating change if there is a challenging context or if the coaching is not planned over a sufficient period. Despite the challenges around measuring the effectiveness of coaching, there is a converging view that positive outcomes of coaching can be achieved in the context of a collaborative, trusting relationship with the coach.

#### 3.3.4.1 Collaborative alliance

Effective coaching is underpinned by a strong coaching relationship. The coaching relationship and the active contribution of coachees is reported to positively influence outcomes (Adams, 2013, p.16). Murphy and Duncan (2007) suggest that coachee factors and the collaborative alliance contribute more to the influence on outcomes than models or techniques. Bakhshaei, Hardy, Francisco, Noakes and Fusco (2017) attributed the success of a coaching program to a personalised, voluntary, non-evaluative, situated partnership over time whereby the coach and the teacher formed a relationship. The authors also identified five key qualities of a coach as a relationship builder, insider, strong communicator, tech believer, and experienced teacher (Bakhshaei, Hardy, Francisco, Noakes & Fusco, 2017). According to Frazier (2020) instructional coaches can facilitate collaborative alliance when they are authentic, trustworthy, and flexible. To do this it is important that coaches give time to building trust with teachers (Frazier, 2020). Frederickson (2001) broaden-and-build theory offers a possible explanation of this process which suggests that human flourishing stems from positive emotions which broaden an individual's interest, creative thoughts, and actions, and build their resilience (Frederickson, 2001, p.218).

Although change is unlikely without positive emotions and a collaborative alliance, Egan (2002) cautions against over emphasising the collaborative alliance and 'distracting' from the individual's goals (Egan, 2002, p.43). Similarly,

Grant and O'Connor (2018) report that while positive affect with solution focused questions can lead to better outcomes in coaching, progress towards goals is 'core business' and feeling good is not sufficient (Grant & O'Connor, 2018, p.14). Coaching is effective when it involves a collaborative alliance and a personalised approach that builds on the coachee's skills and experiences and encourages their engagement in the process (NHS Leadership Centre, Research into Leadership Series, 2005; Elek & Page, 2019). Further detail around the effectiveness of coaching school improvement will be provided in the next section.

### 3.3.5 Efficacy of coaching in education

Coaching professional development in school can facilitate long-term change for teachers (Elek & Page, 2019). Theeboom, Beersma and Van Vianen (2013) carried out a meta-analysis of the effectiveness of coaching in an organisational context and they reported positive effects of coaching on skills, wellbeing, coping, work attitudes and goal-directed self-regulation. Although Adams (2016b) coached a small sample, Adams (2016b) reported that effective collaborative alliance, agreement about goals and tasks facilitated positive outcomes including self-reported enhanced practitioner confidence and wellbeing, behavioural change, and self-efficacy. Bakhshaei, Hardy, Francisco, Noakes and Fusco (2017) carried out a 'dynamic learning project' using instructional coaching with 50 schools in America. The project involved four, eight-week coaching cycles where teachers' problem solved with a coach around using technology. Following one year, the authors reported that the teachers, principals, and coaches found the coaching an engaging and effective approach as the teachers learned how to use technology and consider why they were using it. The authors also reported that the teachers felt more confident and "re-focused" and 86% of the teacher participants increased the frequency of technology use (Bakhshaei, Hardy, Francisco, Noakes & Fusco, 2017, p.15). A positive influence of technology was also reported on pupil learning outcomes, engagement, collaboration, creativity, communication, critical thinking, and agency.

Following the success of this research, Bakhshaei, Hardy, Ravitz, and Seylar (2019) carried out a second 'dynamic learning project'. Similarly, to the first study

this involved 1:1 formal and informal meetings with the coach, coach classroom observation, co-teaching and modelling and coach-facilitated group work. The authors found similar positive results as project one, however, in addition the authors suggested that the project had a positive influence on the wider school culture because teachers who did not participate in the project reported positive responses (Bakhshaei, Hardy, Ravitz, & Seylar, 2019). However, it is noted that the schools' goals were aligned with the project aims, this is an important positive organisational condition to consider as it could enhance the coaching process and outcomes. The dynamic learning project also only captured data at the beginning and end of the year, it is therefore not possible to understand the process of change over time (Bakhshaei, Hardy, Francisco, Noakes & Fusco, 2017; Bakhshaei, Hardy, Ravitz, & Seylar, 2019). Finally, while the dynamic learning projects included a large sample of teachers and schools, the projects were not published in peer reviewed journals and readers confidence in the research is therefore limited.

### 3.3.6 Summary

Coaching takes a person centred, strengths-based perspective of people in the contexts they live and assumes that 'coachees' can create change. Coaching models helpfully 'anchor' the coaching process when they are sensitively applied to the unique needs of individuals. Through advances in technology and the COVID-19 pandemic, there has been an increase in online coaching. Research reports that coaching can lead to positive individual, interpersonal and organisational change. The coaching studies reviewed here provide helpful insights around the importance of collaborative alliance and the influence of context on coaching outcomes. The chapter that follows provides a systematic review to evaluate and summarise what is known about the effectiveness of coaching in facilitating change in teachers' applications of education technology in primary schools.

## 4 Systematic literature review

### 4.1 Overview

The systematic review begins with a definition of systematic review. The review aims and question are then outlined. The methodology followed during the review is then described, including how and why studies were included. The data extracted from the studies is presented to consider the extent to which each study helps to answer the review question. This is followed by a synthesis of the studies which summaries the influence of the education technology focus, the coaching models applied, the outcomes reported and the barriers and facilitators to creating change in teacher's applications.

#### 4.1.1 What is a systematic review?

Systematic reviews employ robust methodology and evaluation of individual studies to collectively answer what is known about a particular topic (Gough, 2007; Moher, Liberati, Tetzlaff, Altman & the PRISMA group, 2009). Reviews typically begin with a clearly formulated question. The ontological and epistemological stance underpinning this question then informs the methodology and evaluation of the review (Gough, Thomas, & Oliver, 2012). This means that a review may take a perspective which seeks to answer questions around effectiveness, evaluation, prevalence, and experience (Munn, Stern, Aromataris, Lockwood & Jordan, 2018). Of course, the type of question will influence what evidence is needed to answer the review question (Munn, Stern, Aromataris, Lockwood & Jordan, 2018) and this could include quantitative, qualitative, or mixed methods analysis (Gough, Thomas, & Oliver, 2012). Systematic reviews assessing the effectiveness of an intervention may provide qualitative and quantitative information regarding the intervention delivery and content, the participants, and outcomes of the intervention (Munn, Stern, Aromataris, Lockwood & Jordan, 2018). Whereas qualitative reviews are typically interested in the subjective experience of the intervention and provide rich qualitative information on the experience of an intervention (Munn, Stern, Aromataris, Lockwood & Jordan, 2018). Different questions therefore offer different types of

reviews and different information (Gough, Thomas, & Oliver, 2012). The systematic review here seeks to answer what is the effectiveness of coaching in facilitating change in teacher’s applications of education technology in primary school settings?

#### 4.1.2 Review rationale, aim and question

The following systematic literature review examines a single review of coaching literature to answer the review question presented in table 1.1 below (Gough, Thomas, & Oliver, 2012). The review is important because it is the aim of the research to enhance teaching and learning with education technology. However, first it is important to understand what is the evidence base underpinning approaches that claim to facilitate change in teacher’s applications of technology. This review will answer why coaching should be explored as a method to facilitate change because the systematic synthesis of research will provide information around the process and outcomes of coaching in supporting teacher development. To manage the complexity of intervention research which can include context, individual differences, and implementation variation (Gough, Thomas, & Oliver, 2012), the first stage of data extraction involved identifying the context, participants, and coaching details (see Table 1.4 page 53).

Table 1.1 Systematic review type, aim and question

<b>Review Type</b>	Effectiveness
<b>Aim</b>	To evaluate the effectiveness of coaching as an intervention to facilitating teacher’s professional development with technology
<b>Review question</b>	What is the effectiveness of coaching in facilitating change in teacher’s applications of education technology in primary schools? This could include change in teacher’s knowledge, confidence, and skills in using education technology.



#### 4.1.3 Review methodology

All systematic reviews employ robust methodology to attempt to minimise bias and make decision making explicit (Gough, 2007). However, the methodology employed during systematic reviews can vary depending on the type of review conducted. According to Gough (2007) the process of completing a systematic review involves a systemic map of the research and then a systematic synthesis of studies. The systematic review here followed the steps outlined by Gough (2007). A systematic map of the research progressed from the creation of a review question, the inclusion and exclusion of studies criteria, and the search strategy was specified. Following the search, studies were screened to assess if they met the inclusion criteria and the studies included are described (Gough, 2007). The systematic synthesis of studies involved an evaluation of the quality and helpfulness of the studies in answering the review question (Gough, 2007). The 'weight of evidence' framework informed decisions around the quality and relevance of each study in answering the review question (Gough, 2007). The scoring and reasons underpinning each judgement are outlined in Appendix F. The review was reported using the Preferred Reported Items for Systematic Reviews and Meta-analyses checklist because this framework is appropriate for reporting evaluations of interventions (Moher, Liberati, Tetzlaff, Altman & the PRISMA group, 2009).

#### 4.1.4 Inclusion criteria

Here evidence which can help answer the review question is defined (Gough, 2007). The decision was taken to focus on primary school settings only because secondary schools have larger school systems which could influence the change process (Divaharan & Cher Ping, 2010). With the constraints of a single researcher and restricted data collection timeline it would not be possible to complete coaching with a large sample or capture change in a larger setting accurately. The systematic literature review was therefore also concerned with coaching in primary school settings only.

Table 1.3 inclusion criteria

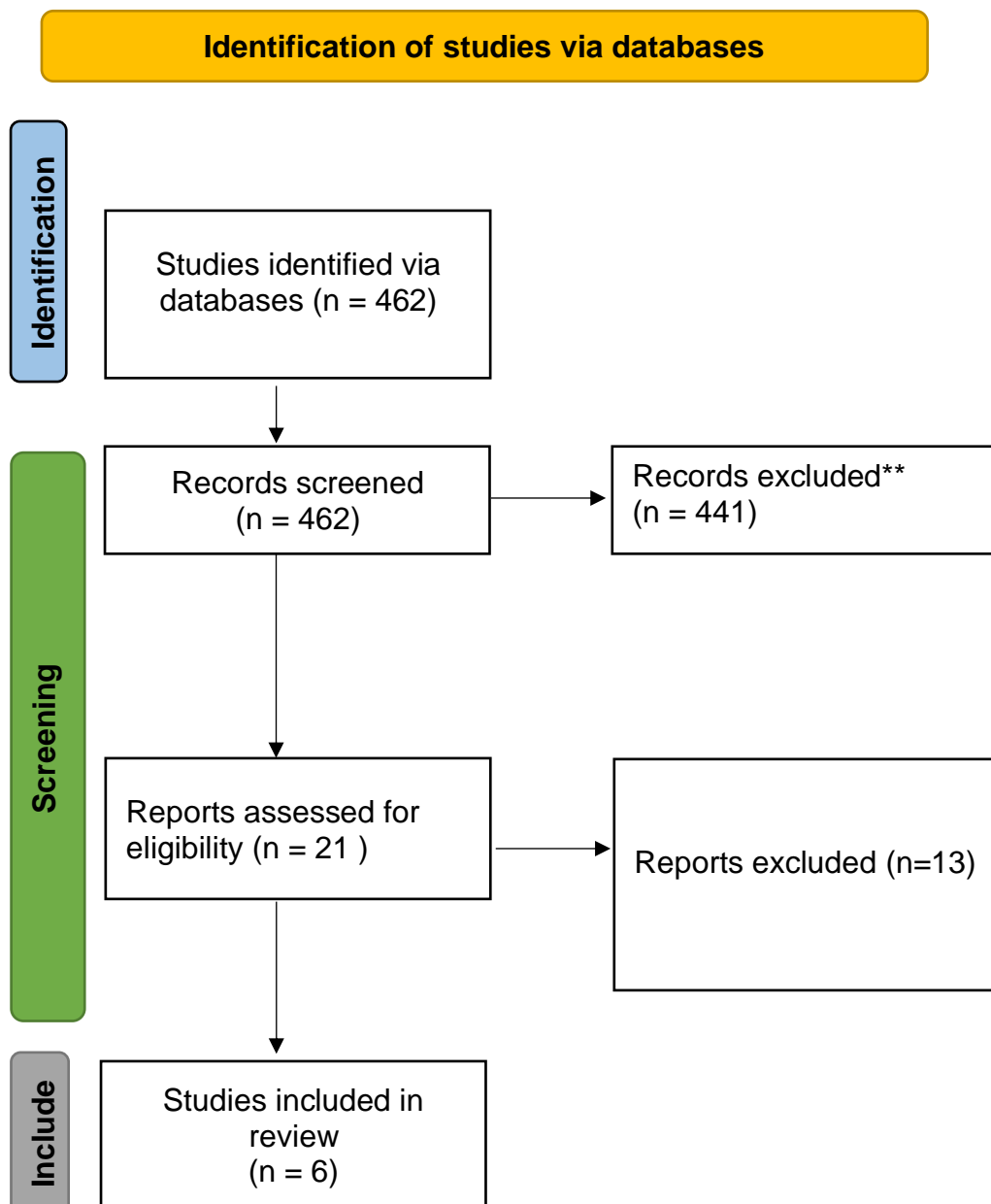
<b>Focus</b>	<b>Criteria</b>
Design	All designs were included if they provided evaluation around the influence of coaching to facilitate applications of education technology. This could include for example, action research, case studies.
Participants	A coaching session is conducted between a coach and coachee. The coachee is a teacher or senior leader in a mainstream primary or elementary school.
Setting	A primary school or elementary school setting.
Intervention	Any model which applies coaching, such as, instructional, solution-oriented, or cognitive behavioural coaching.
Outcome measures	Quantitative and/or qualitative outcomes around teacher confidence, knowledge, and skills in using technology to support teaching and learning.
Context	Coaching in person in school, via telephone or video call.
Other	Research published in English and in peer reviewed academic journals were included. Dissertations and theses were excluded.

#### 4.1.5 Search strategy

A systematic search was completed using Psychinfo, Education Resources Information Centre (ERIC) and Web of Science because of the relevant peer reviewed journals available in each database. The systematic search was carried May 2022. The search terms were “Coaching” AND “teachers” AND “Technology”. The decision was taken to include the broad term of “Coaching” so that all coaching models were captured in the search to compare effectiveness. The broad term “teachers” was used to capture teachers with all ranges of experience and teachers working in a primary school year group. The broad term “Technology” was used to capture all types of education technology application, including the terms iPad and laptop for example would not capture all relevant studies.

#### 4.1.6 Data screening

The data screening process is presented in figure 1.2 page 51. The studies were screened to consider if they met inclusion criteria (Gough, 2007). The first stage of screening involved reading the title and abstracts of 464 records. The decision was taken to exclude studies if the sample or instruments used were not described, secondary school or special school teachers participated, the outcomes of the coaching process did not include a technology focus, or they explored how technology could enhance the coaching process.



**Figure 1.2 Review identification, screening, and inclusion process**

## 4.2 Results

### 4.2.1 Description of studies

Table 1.4 page 54 provides a summary of the participants, design and coaching methods employed in the studies. There was variation in number of participants in each study ranging from 3-33 teachers and one or several coaches. Interestingly, most studies took place in the United States where studies referenced the context of 1:1 iPad initiative in schools which amplified the need for teacher professional development around technology. Table 1.4 highlights

that a range of coaching models were employed, and this took place alongside other aspects of technology professional development, such as, workshops. There was variation between and within studies in the types of education technology applied in classrooms. All studies argued that change with technology takes time and professional development should be sustained, this ranged from 3-4 weeks to a year. Table 1.5 page 56 provides a summary of study design, outcome measures and analysis. It is not surprising that most studies employed a case study design as this captured the context in which the technology was applied. Studies employed qualitative methods such as interviews, to capture helpful information around the experience of using the models and some studies triangulated this with other methods such as, observations and surveys to capture change in perceptions and applications.

Table 1.4 summary of study participants and coaching methods

<b>Authors</b>	<b>Country</b>	<b>Participants</b>	<b>Coaching model</b>	<b>Coaching Duration</b>	<b>Education Technology explored</b>
Grierson, Gallagher, and Hilaire (2022)	Canada	31 teachers from 9 different schools	Varied coaching formats	One school year (8 months)	Google suite applications e.g google classroom and Chromebooks
Zimmer and Matthews (2022)	United States	11 teachers	Virtual Professional development based coaching model	8 months	A range of education technology were resources emailed to teachers. Examples were not provided.
Liao, Ottenbreit-Leftwich, Glazewski and Karlin (2021)	United States	3 teachers	'sustained, situated and personalised' coaching activities	3-4 weeks	Google Sites, Google slides, Nearpod, Seesaw, Shadow Puppet and DoInk application.
Hilaire and Gallagher (2020)	Canada	5 teachers 1 coach	'gradual release of responsibility model' (Hilaire and Gallagher, p19).	4 months	Teaching literacy with a Smartboard
Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding and Guo (2020)	United states	7 coaches	'instructional coaching style'  iterative coaching model focused on personalisation and relationship building	'one year period' p210	Screencasts, online videos, applications, Seesaw, Canvas, Classkick, Bee Bots, Dash and Dots, Ozobot

Hutchinson and Woodward (2018)	United states	33 teachers	Technology integration planning cycle model of professional development	'year long study'	Chromebooks
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Table 1.5 summary of study design, outcome measures and analysis

<b>Authors</b>	<b>Design</b>	<b>Outcome measures</b>	<b>Analysis</b>
Grierson, Gallagher, and Hilaire (2022)	Case study	Field notes, interviews, artefacts, and observation of 18 individual coaching sessions	Inductive interpretative analysis
Zimmer and Matthews (2022)	Mixed-methods experimental study	Pre and post Digital learning identity survey ,artifact timeline of change, focus group , weekly check in forms , goal setting sheets	Wilcoxon Signed-Rank Comparison  Qualitative coding  Thematic analysis
Liao, Ottenbreit-Leftwich, Glazewski and Karlin (2021)	Multiple Case study	11 video recordings of classroom observations, 1 technology showcase video and two interviews with each teacher.	Digital content analysis  Thematic analysis
Hilaire and Gallagher (2020)	Design based research (cycles of implementation and collaboration to review a design)	Surveys, interviews, field notes, co-planning meetings and lesson observations.	Inductive analysis
Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding and Guo (2020)	Case Study	Open ended coach questionnaire, coaching session notes, transcriptions of monthly coach reflection meetings and teacher interviews.	Content analysis
Hutchinson and Woodward (2018)	Mixed-methods study	Pre and post measures. Survey, interviews, field notes, lesson observations, diaries.	Paired-sample t tests, qualitative open coding,



			descriptive analysis, ANCOVA
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#### 4.2.2 Appraisal of studies

Gough's (2007) Weight of Evidence framework was used to assess the quality of the studies. The Weight of Evidence assessment is summarised in table 1.6 below. Weight of evidence A refers to the overall soundness of the research. In the current review, this included consideration around if and how the research described the participants, education technology focus and coaching process. Weight of Evidence B refers to the appropriateness of the design and methodology in answering the reviewing question. In this review, the author was interested in if studies used mixed methods to capture change as an appropriate design. Weight of Evidence C refers to the relevance of the study in answering the review question, for this reason, the author paid attention to if and to what extent studies provided a specific education technology and coaching model and if the study captured change in practices. Finally, Weight of evidence D refers to an overall assessment of the research's contribution to the review question by combining judgements A, B and C. The criteria to inform these evaluations, and corresponding scores are presented in Appendix F.

Table 1.6 weight of evidence assessment

<b>Study</b>	<b>Weight of Evidence A</b>	<b>Weight of Evidence B</b>	<b>Weight of Evidence C</b>	<b>Weight of Evidence D</b>
Grierson, Gallagher, and Hilaire (2022)	Medium	High	Medium	Medium
Zimmer and Matthews (2022)	Medium	High	Medium	Medium
Liao, Ottenbreit-Leftwich,	Medium	Medium	Medium	Medium

Glazewski and Karlin (2021)				
Hilaire and Gallagher (2020)	Medium	High	Medium	Medium
Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding and Guo (2020)	High	High	Medium	High
Hutchinson and Woodward (2018)	High	High	Medium	High

#### 4.2.3 Implications of quality appraisal as a whole to answer the review question

The review sought to answer what is known about the effectiveness of coaching in facilitating change in teacher’s applications of education technology in primary schools. The two studies receiving the highest quality judgement were Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding and Guo (2020) and Hutchinson and Woodward (2018). Most studies helpfully triangulated data sources and provided descriptions around the contexts in which the coaching and education technology applications took place. Most studies described the coaching practices in detail, and this took place between 1-12 months with multiple teachers, this provides helpful insights to the effectiveness of coaching during a period of time and in the context of individual teacher’s strengths and practices. The weight of evidence judgements could have been enhanced in some studies if descriptions of the coaching frequency were provided, and the experience and skills of the coach were outlined and considered during evaluations and if multiple school settings were used. Overall, with judgements falling between medium to high weight across the assessments, the review provides sound evidence around the effectiveness of coaching as a helping framework to facilitate change in teachers’ applications in education technology (further detail around the outcomes of the coaching process will be outlined in the following section). The review is helpful in adding to the study rationale and reflexivity, as the author draws upon this coaching evidence base rather than assumptions and values (Gough, 2007). The

studies drew upon mixed methods and provided helpful descriptions around the process and factors which influenced this process, these factors will be outlined next in a synthesis.

#### 4.2.4 Synthesis

The studies are synthesised to answer the review question: what is the effectiveness of coaching in facilitating change in teachers' applications of technology? Intervention research is complex and influenced by context, individual differences, and implementation variation (Gough, Thomas, & Oliver, 2012). It is not possible to make claims that coaching alone facilitated change because all studies took place in the context of additional educational technology professional development. To assess to what extent the studies answer the review question, the synthesis will provide further detail around the influence of the education technology focus, the coaching models applied, the outcomes of coaching and the barriers and facilitators reported to influence change in teacher's applications.

##### 4.2.4.1 Definitions and types of education technology application

It is relevant to consider how studies define education technology because definitions could focus on a range of education technology material which may not be relevant in five year's time. Definitions of education technology also make different assumptions about the process of learning, the role of the teacher and pupil, the nature of the learning task, social interaction, and the outcomes of learning. It is therefore important to consider how the studies defined education so that their findings can be understood. Most studies focused on enhancing teachers' confidence, skills, and knowledge with technology generally. However, Hilaire and Gallagher (2020) focused on SMART board applications to enhance literacy teaching and learning. Some studies defined education technology applications. For example, Zimmer and Matthews (2022) defined teacher's 'digital literacy' "as the ability to use digital tools to read, write actively, and communicate (speaking, listening, and viewing) using digital tools and resources." (Zimmer & Matthews, 2022, p.2). Whereas Grierson, Gallagher, and Hilaire (2022) focused on 'broad' applications of technology across the curriculum to support assessment, introduce ideas and consolidate learning.

Although Liao, Ottenbreit-Leftwich, Glazewski and Karlin (2021) did not define 'technology integration', the authors explained that the ISTE (2017) technology standards for education was used to create and focus teacher's goals on technology application. Liao, Ottenbreit-Leftwich, Glazewski and Karlin (2021) referred to 'goal-oriented technology applications' and they defined this as "a teacher's use of technology in teaching and learning related to their individual professional development coaching goal for technology integration, while general technology uses referred to any other uses of technology in classrooms." (Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021, p.5). Hutchinson and Woodward (2018) did not define education technology application but described a 'Technology Integration Planning Cycle' which was used to identify teachers' instructional goals with technology. It is interesting to note that the studies varied greatly in the extent to which they focused on or if they offered a definition of education technology, a challenge highlighted in the literature review by Passey (2019).

#### 4.2.4.2 Coaching rationale, models and theory applied

Most studies referenced that a traditional 'one size fits all' method of professional development with technology, such as, one off training does not lead to sustained changes in teachers' applications (Zimmer & Matthews, 2022; Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021). Hutchinson and Woodward (2022) suggested that coaching presents an opportunity to address barriers to applications. Zimmer and Matthews (2022) argued that coaching is more likely to support teachers' application of technology because coaching enables teachers to reflect on practice and can be personalised and sustained over a period (Zimmer and Matthews, 2022).

The studies varied in the coaching model used and its theoretical underpinning. Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding and Guo (2020) developed a coaching model that prioritised relationship building between the coach and teacher and a personalised approach to coaching teachers' specific needs and goals. Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding and Guo (2020) suggested that their findings reflect Knight's (2017) effective instructional coaching cycle because

changes in applications progressed in the context of goal identification, modelling, and reflection on changes in application. Zimmer and Matthew's (2022) model of coaching drew upon teachers' experience and self-regulated learning to support goal setting, monitoring, and reflection. While Grierson, Gallagher, and Hilaire (2022) applied Dweck (2006) mindset theory to propose that coaching presents an opportunity to develop teacher's growth mindsets towards technology.

Variation was also noted in the duration, frequency and format of coaching as well as the coach's experience. There were also differences in the frequency of coaching sessions within studies (Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021) which was reported to be informed by participant needs and requests (Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding & Guo, 2020). Most studies described the coach's experience with technology. In all studies the coaches did not hold specific coaching qualifications or experience and they varied in their experience in using technology. The studies also differed in how they conducted the coaching with teachers. Zimmer and Matthews (2022) conducted virtual coaching which involved emails, video, and shared Google documents (Zimmer & Matthews, 2022). All other studies completed the coaching in school contexts. Liao, Ottenbreit-Leftwich, Glazewski and Karlin's (2021) coaching activities involved meetings with the coach, modelling of applications in the classroom and follow up meetings. Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding and Guo's (2020) iterative coaching model involved problem solving around technology challenges, modelling, team teaching, sharing resources, and observations. Similarly, Hilaire and Gallagher (2020) provided "professional learning sessions, focused lessons and guided instruction, collaborative learning, and independent practice" (Hilaire & Gallagher, 2020, p.20). Although studies varied in the models they applied, all studies personalised the content of the coaching activities to teachers' individual needs.

#### 4.2.4.3 What were the outcomes of coaching?

All studies reported positive changes in teachers' applications of technology. Following coaching, teachers reported feeling more comfortable and confident applying technology (Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding & Guo, 2020;

Grierson, Gallagher, & Hilaire, 2022). Grierson, Gallagher, and Hilaire (2022) found that following coaching, the teachers' interest in technology applications continued and the teachers reported increased pupil motivation and engagement when using technology. Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding and Guo (2020) found that while change in applications of technology was gradual and slow, it became part of some teacher's everyday practice. Hutchinson and Woodward (2018) also found that teachers' confidence, and perceptions of their skills in using Chromebooks significantly improved, the teachers increased the frequency of technology application and developed new ways of planning with technology.

In Zimmer and Matthews (2022)'s study most participants enhanced their 'Digital Learning Identity' and how they planned integration of technology in lessons. The teachers reflected that the coaching provided "essential" time to reflect, and they increased their awareness of why, when, and how to apply technology (Zimmer & Matthews, 2022, p.11). The teachers also reported that they have better access to technology resources because of the sharing and discussions during the professional learning community groups (Zimmer & Matthews, 2022, p.9). Hilaire and Gallagher (2020) coached teachers around applications of technology to enhance teaching and learning in reading. The authors reported that following the coaching the teachers were able to carry out SMART board lessons (Hilaire & Gallagher, 2020).

In contrast, Liao, Ottenbreit-Leftwich, Glazewski and Karlin (2021) measured changes in teachers' applications of technology in the context of one to one coaching and interpersonal and contextual influences. The authors did not find significant changes in all participating teachers' applications of technology following coaching. However, the three teachers reported that the coaching process was a positive professional development experience, and the authors suggest that the coaching supported teachers' knowledge and skills in using technology. For example, one teacher explained how they used videos, and this helped them to assess students learning and it also supported student engagement (Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021, p.9).

#### 4.2.4.4 How did coaching facilitate change?

Teachers reported that the self-paced, personalised coaching and implementation planning was helpful in finding out exactly what teachers needed, and that this was important because goals varied for each teacher (Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding & Guo, 2020; Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021; Hilaire & Gallagher, 2020; Grierson, Gallagher, & Hilaire, 2022; Zimmer & Matthews, 2022). Some teachers knew what support they needed while others didn't know what goals they wanted to achieve with technology (Grierson, Gallagher, & Hilaire, 2022). Focusing on specific goals one step at a time helped teachers to 'zone in' (Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021), kept teachers on track and created feelings of accomplishment (Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding & Guo, 2020; Zimmer & Matthews, 2022, p.10). Hutchinson and Woodward (2018) suggest that the coaching model they used gave teachers a language and small steps over time to support planning and this helped the teachers to feel more positive and more likely to apply technology because they had successful, supported, and gradual experiences (Hutchinson & Woodward, 2018).

With regards to what aspects of the coaching process facilitated change, the relationship with the coach was reported to be an 'essential' feature that helped facilitate change because it created transparent communication, sharing of feelings and needs, and this in turn helped the coach to accurately identify and understand teacher's needs (Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding & Guo, 2020; Hilaire & Gallagher, 2020; Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021). Grierson, Gallagher, and Hilaire (2022) described the relationship between the teachers and coach as supportive, respectful, and trusting. Grierson, Gallagher, and Hilaire (2022) note attributes of the coach that facilitated the coaching process included that coach's flexible approach, they were resourceful and calm when faced with barriers to technology application and skilled in engaging and building relationships with teachers. Liao, Ottenbreit-Leftwich, Glazewski and Karlin (2021) reported that the coach demonstrated respect and trust in teachers' views, and that this gave teachers the flexibility and autonomy they needed to explore technology applications. The authors offer a possible

explanation that the coaching relationship helped teachers to trust the coach, and the coaches reported that this meant that the teachers were more open to the coach's suggestions (Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021). According to Liao, Ottenbreit-Leftwich, Glazewski and Karlin (2021) it was also important that the coach checked in with teachers to assess if the coaching was supporting their needs.

The studies reviewed reported that teachers found modelling, troubleshooting, co-teaching, and personalised resources helpful (Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding & Guo; 2020; Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021). Teachers in Zimmer and Matthews (2020) reported that coaching activities including emails, weekly check-ins, and goal setting most helpful in progressing towards goals. The teachers also valued receiving resources from the coach because it helped them to reflect and learn something new (Hutchinson & Woodward, 2018; Zimmer & Matthews, 2022). On the other hand, participants emphasised that it was important that they could plan their time and decide for themselves regarding what information they engaged with (Zimmer & Matthews, 2022). Grierson, Gallagher, and Hilaire (2022) found that teachers with low confidence in particular reported co-planning and co-teaching with a coach supportive.

#### 4.2.4.5 What were the facilitators to change?

Facilitators of change included the alignment of teachers' pedagogical beliefs and views about technology, sufficient time was given to coaching activities, problems around technology availability were solved with leadership, learning communities in schools provided support and sharing, and using technology to coach removed some time and location barriers to coaching. Liao, Ottenbreit-Leftwich, Glazewski and Karlin (2021) reported individual differences in teacher's motivation to learn and try new practice, pedagogical beliefs, and the value they placed on technology enhancing learning. The authors explained that these beliefs seemed to enhance or inhibit change in teacher's applications, such that if a teacher held high motivation to learn and try new practices and values towards the contribution of technology in supporting teaching and learning, they were more likely to demonstrate changes in their practice (Liao, Ottenbreit-Leftwich, Glazewski &



Karlin, 2021). In contrast, if the practice did not fit with their pedagogical beliefs, they were less likely to implement the technology (Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021). The authors offer a possible explanation that coaching is enhanced when coaches understand a teacher's views around technology and pedagogy before beginning the coaching process (Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021).

Coaching was enhanced when sufficient time was given to coaching activities. Hilaire and Gallagher (2020) found that giving sufficient time during the coaching activities helped teachers to feel comfortable in trying new applications. Hilaire and Gallagher (2020) also found that it helped to liaise with leadership around problems the teachers could not resolve. For example, the coach identified that a SMART board was incompatible with a monitor and requested a new monitor for the teacher. Without time and resources, the coaching process would be ineffective in creating change.

Organisational factors positively influenced changes in applications of technology. Teachers in Hutchinson and Woodward's (2018) study participated in twice weekly professional learning community meetings where teachers reflected on their goals. The teachers reported that the professional learning community increased perceptions of efficacy and 'camaraderie' because they could share with peers and ask questions (Hutchinson & Woodward, 2018). In addition, teachers also received weekly emails with an example of App integration and lesson plan (Hutchinson & Woodward, 2018). Zimmer and Matthews (2022) also found that support from peers and students helped teachers to apply technology (Zimmer & Matthews, 2022). Meeting with colleagues provided support and encouragement and in turn facilitated applications of technology (Hutchinson & Woodward, 2018; Zimmer & Matthews, 2022).

Technology was used in some studies to conduct coaching activities. Grierson, Gallagher, and Hilaire (2022) found that coaching online helped the coach to provide support and that coaching in person could've been restricted by time and location. The teachers in this study also reported that it helped to have a website where they could find information (Grierson, Gallagher, & Hilaire, 2022).

Hutchinson and Woodward (2018) used email to share examples of practice with teachers and this gave them a broad range of relevant examples without overwhelming teachers. The authors found that the emails led to further discussions in schools (Hutchinson & Woodward, 2018).

#### 4.2.4.6 What were the barriers and challenges to change?

Negative influences on changes in technology applications included the coaching process, problems with technology and coach knowledge and skills. Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding and Guo (2020) found that teachers sometimes found it difficult to meet with the coach due to other priorities in school. Teachers reported wanting to practice applying technology but were concerned to give time to technology practice because this could impede on preparation for summative assessments (Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding & Guo, 2020). Similar findings were reported by Liao, Ottenbreit-Leftwich, Glazewski and Karlin (2021) whereby two participants shared that the pressure to prepare pupils for standardised curriculum-based assessments meant that they couldn't give sufficient time to practice the technology applications.

There were some technical problems in using technology which sometimes broke during lessons and negatively influenced how the coach and teachers could apply technology. For example, some applications needed to be updated but this was delayed, and the teacher then decided against using technology (Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding & Guo, 2020). To install an application this took several steps to approve and could take several weeks, this meant that the coaches and teachers were sometimes restricted in the tools they could use. The coach suggested that these experiences increased the teacher's distrust in using technology (Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding & Guo, 2020).

The coaching relationship was reported to be influenced by personalities and that some teachers and coaches didn't 'click' (Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding & Guo, 2020). Some coaches reported difficulties in trying to 'sell' an app and that it was "often difficult to convince the teachers that a tool might be beneficial to the class and students." (Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding & Guo, 2020, p.216). Sometimes the coaches did not understand what the

teachers needed or the educational context. For example, in one school a coach was unfamiliar with a particular year group and was unable to offer suggestions around technology applications (Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding & Guo, 2020).

### 4.3 Discussion

#### 4.3.1 What is the effectiveness of coaching in facilitating change in teacher's applications of technology?

In summary, the studies reviewed here suggest that coaching offers an effective approach to facilitate change in teacher's applications of technology. Overall the studies reported positive changes in teacher's confidence, perceptions, and teaching with technology. Some findings also suggested a positive influence of these changes on pupil engagement and motivation. The coaching process appeared to facilitate change because it focused teachers personalised goals, provided time to reflect, and increased teacher's awareness of resources and how to use them. The studies align with previous research that suggest a trusting, supportive and respectful relationship with a coach who was flexible is a key factor to facilitate change. Coaching activities including modelling, troubleshooting, co-teaching, and personalised resources were reported to be helpful. However, the studies did not evaluate the effectiveness of a coaching model as all studies included a combination of professional development activities around technology.

Nonetheless, the review provides helpful information around individual and contextual factors that could have contributed to the successful changes in application. Factors that contributed positively to change in the context of coaching are summarised in figure 1.3 on page 68. Individual factors that enhanced outcomes included teacher's pedagogical beliefs and positive values towards technology in education. Interpersonal and organisational factors that positively influenced outcomes included sourcing technology resources with leadership, professional learning community meetings and online coaching. Factors that inhibited change in the context of coaching are summarised in figure 1.4 on page 69. Organisational factors which negatively influenced outcomes

included limited time to practice applications because of time needed to prepare for summative assessments, problems with technology resources breaking or being available, and coaching skills. There were some limitations in the quality of the research and coaching processes applied which could also have influenced the coaching outcomes and they will be outlined in more detail here.

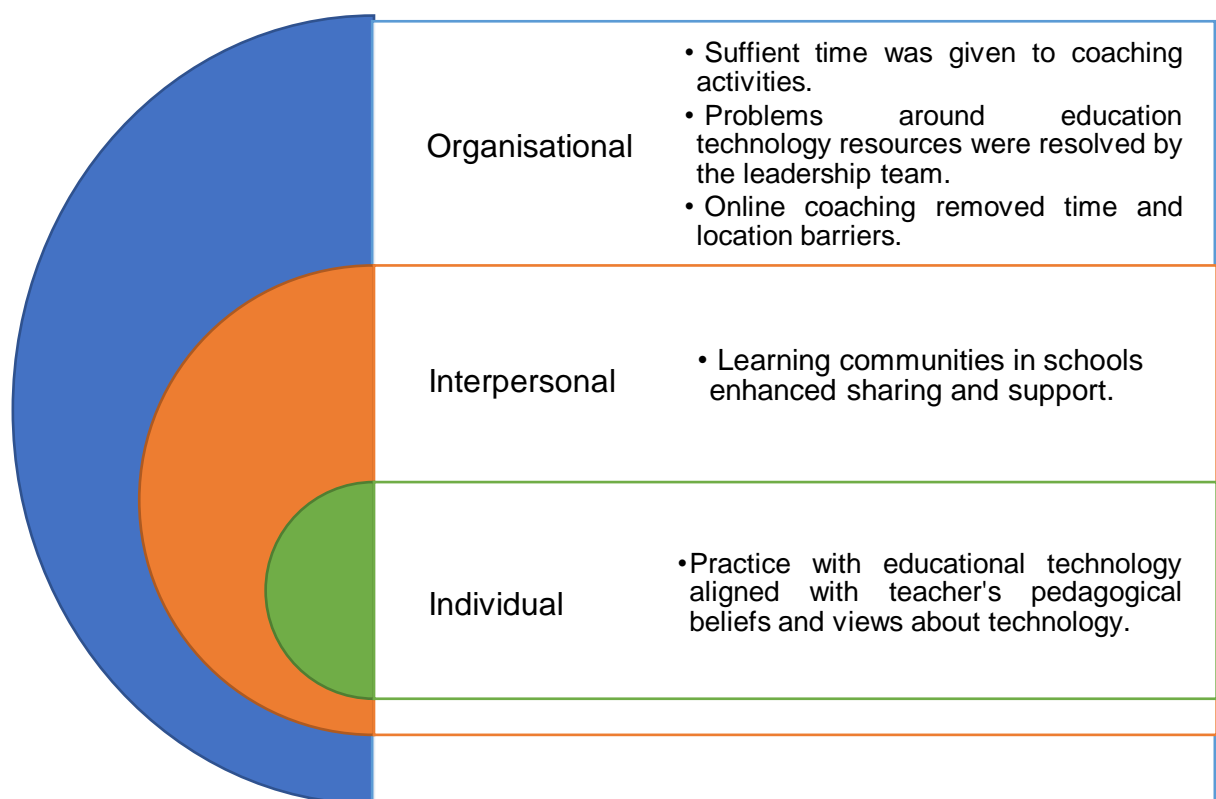


Figure 1.3 Concept map of facilitators which contributed positively to the success of coaching in facilitate change in education technology applications.

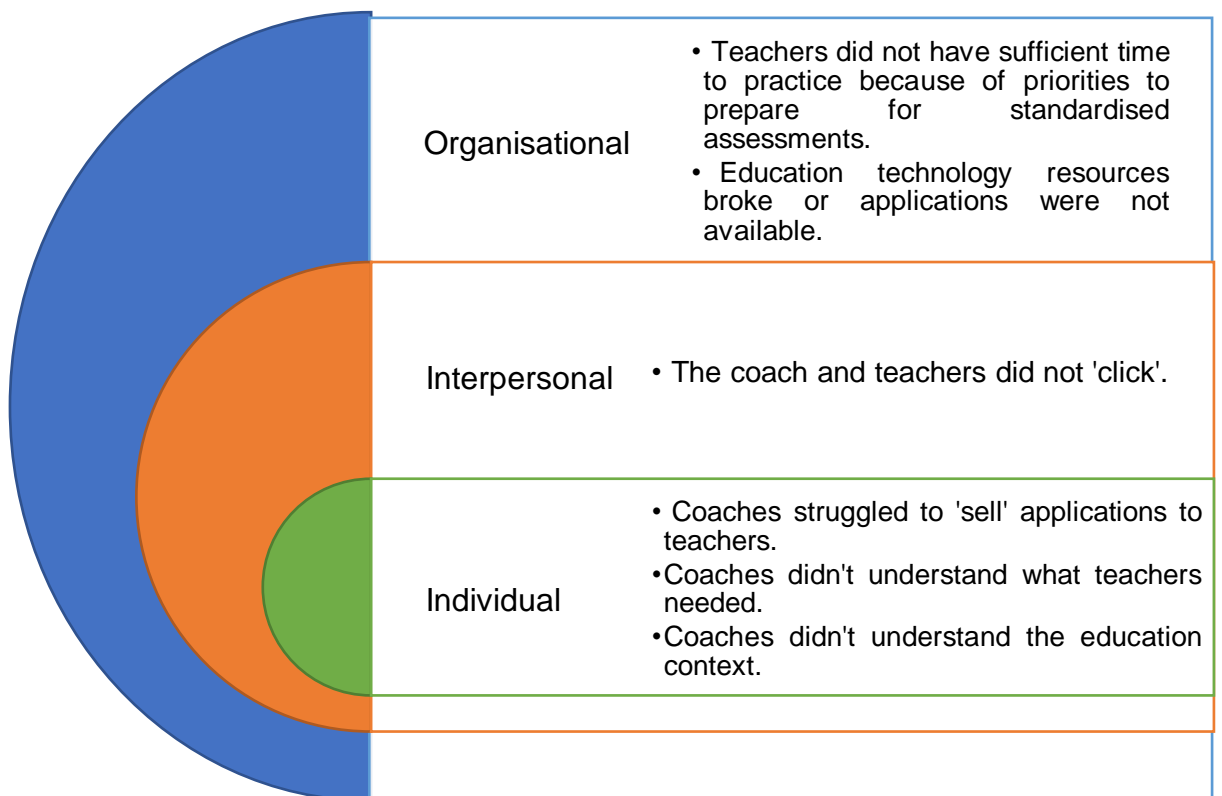


Figure 1.4 Concept map of barriers which inhibited the success of coaching to facilitate change in education technology applications

The studies reviewed did not all define the application of education technology they focused on and varied in the coaching models they applied. This reflects Passey's (2019) suggestion that education technology research is sometimes not clearly defined. The studies did, however, provide some contextual information to explain how the coaching facilitated changes in applications. A range of coaching activities were employed, with most studies taking what seemed to be an instructional coaching approach. The studies did not report specific coaching training, qualifications or experiences of coaches reflecting the fact that coaching is an unregulated profession. If the authors provided details around a coaching procedure and an example coaching process, this could have enhanced trustworthiness and dependability.

Some limitations in the coaching process applied were also noted. Liao, Ottenbreit-Leftwich, Glazewski and Karlin (2021) shared an example of a teacher who "had comparatively lower knowledge, skills, and confidence in technology use, and they were considered as having the highest potential for change" (Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021, p.11). However, the teacher reported limited change in their applications and the authors suggested that coaching had a minimal input because of the teacher's knowledge, skills, and organisational pressures (Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021). The teacher shared that they were, "afraid of playing around with stuff because one time I wiped out my grades completely by trying to figure something out" (Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021, p.5). It could be argued that the coaching approach was not sufficient in increasing the teacher's confidence. A cognitive-behaviour coaching approach could help the teacher to identify the thoughts and feelings that maintain a view that technology is scary (Grant, 2014). A cognitive behaviour approach could help the teacher to develop balanced and flexible thoughts around technology applications (Grant, 2014). Furthermore, a solution-oriented approach could have enabled the teacher to focus on the times that they had used technology well and this could have supported their confidence and planning around the strategies the teacher could use to restore a technology if it breaks (Cavanagh & Grant, 2010).

Another criticism of the coaching models applied include that the coach was reported to be solving problems for the teachers and this became problematic when the coach was unable to solve all the teachers' problems (Hilaire & Gallagher, 2020). Some coaches also reported difficulties in trying to 'sell' the use of applications to teachers (Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding & Guo, 2020). By trying to solve the teacher's problems and 'sell' an application, the coach potentially undermined the teacher's self-determination and capacity to solve problems in the future (Ryan & Deci, 2000). The application of psychology could have helpfully supported teacher motivation by for example, considering where teachers were on the change cycle and reflecting back the strategies that could support the teacher's competence, autonomy and relatedness (DiClemente & Prochaska, 1998; Ryan & Deci, 2000; Palmer & Cavanagh, 2006).

#### 4.3.2 Limitations of the review

It is important to acknowledge the limitations of the systematic review. Only three databases (Psychinfo, ERIC and Web of Science) were used to search for studies, it is therefore possible that a search that included more databases could have captured more studies. Some relevant studies to the research question may have been excluded because of the inclusion criteria applied. The review also only included published studies and teachers in primary and elementary schools. This could have omitted doctoral studies and those with teachers in other school settings. While the application of the weight of evidence model was applied with rigour, this is of course open to subjectivity and bias. Table 1.6 on page 54 was included to enhance transparency around these judgements.

### 4.3.3 Conclusions

It is concluded that coaching offers a helpful framework to support schools in thinking about how and why technology can be used effectively, and to facilitate planning and change in applications. However, more research is needed to explore the application of a specific coaching framework with psychology in an English primary school context. The systematic review aimed to bring together and review what is known about the effectiveness of coaching in facilitating change in teachers' applications of technology. The review highlights there is a limited number of studies that have explored the influence of coaching on teachers' applications of technology. The review did not find any studies from an English primary school context.

Coaching offers a framework to support teachers to reflect around how and why technology can be used effectively and facilitate planning to change applications. While all studies reported a positive influence of coaching on teachers' confidence, knowledge and applications, there was considerable variation in the coaching models applied and changes in teacher's applications. The coaching models also included different professional development activities, and this made it difficult to understand and claim to what extent coaching alone contributed to the changes in teachers' applications. However, the qualitative data in the studies helpfully captured how effective applications of education technology is shaped by both individual and organisational factors.

Further research is needed to explore the influence of specific coaching models on teachers' applications of education technology and a qualitative approach seems most helpful to understand the process of change. Some of the limited changes in teachers' applications suggest an opportunity to apply psychological theory around motivation. This chapter captured a systematic review of the effectiveness of coaching, the following chapter takes the findings forward to inform the research questions and rationale.



## 5 Current study

### 5.1 Research aims, purposes and questions

The project aimed to enhance teaching and learning with the application of education technology. There were three purposes of the research: to explore the process of using a solution-oriented coaching framework to facilitate change in education technology, to describe the outcomes of the coaching process, and to make theoretical links to psychology to consider how the framework facilitated change. The research questions (RQ) below evolved as the research progressed.

RQ1) How can a solution-oriented coaching framework be applied with a primary school setting to facilitate change with education technology?

RQ2) How can a solution-oriented coaching framework help teachers to develop their knowledge, confidence, and skills in applying education technology?

#### 5.1.1 Relevance and implications for educational psychologists

EPs are evidenced based practitioners, this means that they draw upon research as one piece of evidence during consultation, assessment, intervention, training, and research (Boyle and Kelly, 2015). In each of these areas of practice, EPs also play a role in promoting the inclusion of all CYP in education (DfE, 2014; BPS, 2022b). EPs therefore need to be informed of education technology research that evidences how learning environments can be enhanced (BPS, 2022b, p.3). Brown, Powell, and Clark (2012) suggest coaching provides an opportunity for EPs to facilitate early intervention and with the potential to enhance teaching and learning for more pupils in the future (Brown, Powell, & Clark, 2012, p.30). Fanshawe (2019) found that 81% of participant EPs believed coaching could achieve positive outcomes in schools and aligns with EP practice. The present study is relevant for EPs because it captures the application of a solution-oriented coaching framework to facilitate change in education technology.

### 5.1.2 Rationale for solution-oriented coaching framework to facilitate applications of education technology and enhance teaching and learning

A vision for education technology to enhance outcomes for CYP has been espoused internationally (Department for International Development's EdTech research and innovation Hub, 2021) and in education policy (DfE, 2019; DfE, 2022). Education technology is defined as devices, software and digital resources applied in education with the aim of enhancing teaching and learning (DfE, 2019). The evidence base around outcomes of learning with technology is complex and is sometimes criticised for limited or unclear definitions and theoretical underpinnings (Passey, 2019). Despite this, research has demonstrated positive outcomes of education technology applications (Deunk, Smale-Jacobse, de Boer Doolgaard & Bosker, 2018; EEF, 2019; Newhouse, 2015). Research reports that good practice with education technology involves a range of approaches that fit with learning approaches known to be effective in supporting learning (Clifford & Miles, 1998; Koehler & Mishra, 2013; Greenwood & Kew-Jones, 2016; EEF, 2019).

However, the potential influence of technology to enhance teaching and learning outcomes is influenced by many factors including, the learner, the teacher and wider context (Bower, 2017, p.13; EEF, 2019; Lewin et al., 2019). Teacher confidence, skills, agency, and lack of training are reported as the most common barrier to using more technology (British Educational Suppliers Association EdTech survey, 2018; Strawbridge et al., 2018; DfE, 2021b). Previous research highlights challenges surrounding top-down training if it doesn't reflect teacher's views (Thorvaldsen & Madsen, 2020), if it moves too quickly, does not match unique classrooms, or does not provide opportunities for collaboration or practice (McGrath, Karabas & Willis, 2011). The DfE (2021) proposes that schools need more education technology strategy development support. School improvement and organisational perspectives provide helpful insights into the barriers and facilitators of technology implementation (Harris, 2002; Schein, 1990; Divaharan & Cher Ping, 2010; Zhu, 2015; ISTE, 2021). Gu, Crook, and Spector (2019) suggest further research is needed around interactions between teachers and the extent to which this could influence applications of education technology.

Facilitating change in education technology therefore requires considerations around organisational conditions, individual skills, confidence and experience, and opportunities for self-directed learning.

The systematic literature review highlighted that there is evidence of the effectiveness of coaching in supporting teacher's applications of technology. However, there are few studies on the influence of a specific coaching model to facilitate technology implementation and there is a lack of research in English primary school contexts (Lai & Bower, 2020). The author considered using an instructional coaching framework, however, it was felt that a strength-based approach would be more appropriate with regards to facilitating teacher confidence in using technology and self-directed learning (Cavanagh & Grant, 2010). Solution-oriented coaching is flexible and has been successfully paired with other coaching approaches previously (Grant, Green & Rynsaardt, 2010), and so could incorporate some aspects of instructional coaching. Previous research reports positive outcomes of solution-oriented coaching including teacher behavioural change, wellbeing, decreased stress, increased self-efficacy, goal attainment and readiness to change (Brown, Powell, & Clark, 2012; Grant, Green & Rynsaardt, 2010; Ellis, 2013; Grant, 2012; Grant, 2014). Rees (2017) developed a systemic solution-oriented model to identify successful methods, systems, and interactions so that they can be replicated (Rees, 2017). It is argued here that systemic coaching offers an appropriate methodology to facilitate conditions known to enhance education technology applications including a culture of supporting and sharing (Harris, 2002; Divaharan & Cher Ping's, 2010; Zhu, 2015; ISTE, 2021). Moreover, a solution-oriented approach rather than a purely solution focused approach seems most appropriate to could acknowledge some of the pain teachers experience when trying to use technology and identify solutions (Rees, 2017).

The DfE espouses the promotion and enhancement of teacher wellbeing (DfE, 2021) and reducing teacher workload (Churches, 2020). The solution-oriented approach offers a containing process for teachers as it draws upon existing strengths and exceptions (Cavanagh & Grant, 2010). Furthermore, each teacher is unique and works with unique pupils, at different developmental stages and

around different curriculum objectives, solution-oriented coaching was selected because it is a flexible framework and can be used across age phases and curriculum topics, together this means teachers could identify what works for them and their pupils (Harker, Dean & Monsen, 2017). Finally, Gu, Crook, and Spector (2019) suggest that research can helpfully evaluate how positive outcomes of education technology can be achieved in different contexts, capturing conditions that facilitate or inhibit application (Gu, Crook, & Spector, 2019, p.1122).The research here seeks to explore how solution-oriented group and individual coaching can be used to facilitate change with education technology for all pupils in an educational setting. Having described the research aims, questions and rationale, the following chapter will discuss the methodology employed.

## 6 Methodology

### 6.1 Overview

This chapter provides a description of the chosen qualitative methodology and addresses why the decisions taken around the methodology are most appropriate to explore the study's aims and research questions. The chapter begins with an overview of applied research paradigms and the research epistemological and ontological position. The research draws heavily on social constructionism and action research is considered as an appropriate means to explore the research aims. An overview of recruitment is presented and this is followed by a description of the solution-oriented coaching and analysis procedures. The chapter concludes with a description of the ethical protocols followed.

### 6.2 Applied research paradigms

There are different ways of asking questions about the world and different questions offer unique perspectives and insights to understanding the world (Shannon-Baker, 2016). Research questions are underpinned by philosophical assumptions about the world and together these assumptions are described in research as a paradigm (Mertens, 2007). According to Mertens (2007) there are four groups of "philosophical assumptions that are most relevant to defining a paradigm in a research context" (Mertens, 2007, p.215). This includes the ontological assumption (beliefs about the nature of reality), the epistemological assumption (the relationship between the research and the world), the methodological assumption (how the world can be studied) and finally the axiological assumption (values and ethics of the research) (Mertens, 2007).

Research aims and questions are created from the researcher's core assumptions about ontology and this in turn informs the researcher's epistemological position (Gelo, Braakmann & Benetka, 2008; Scotland, 2012). It is acknowledged that there is some overlap between paradigms (Karatas-Ozkan & Murphy, 2009, p.455; Robson & McCartan, 2016, p.22). In the exploration of paradigms, the decision was taken to focus on the place of social, subjective and constructionist paradigms as a single integrated paradigm because the current

study takes a collaborative approach to change where it is assumed that there isn't a single, fixed or stable reality.

#### 6.2.1 Present study ontology

The present study draws upon social constructionism. Social constructionism rejects the argument that during the research process people cannot 'step outside' their epistemological and ontological position (Burr, 2015, p.172). Social constructionism is a variation of interpretivism which proposes that through language and daily social interaction individuals construct and understand social reality and their sense of self (Burr, 1995; Alharahsheh & Pius, 2020). The aim of social constructionist research is to explore questions around symbolic interactionism which is the social processes by which knowledge is created and exchanged through language rather than isolated variables or outcomes (Blumer, 1969; Gergen, 1999). Social constructionists assume that through language, meaning or knowledge is created, shared, negotiated, maintained, or changed (Burr, 2015). The social constructionist ontological position therefore reflects the aims of the research to explore the unique solutions teachers and schools can create together through coaching (a conversational helping process).

A positivist view in contrast, might break up the reality of the school education technology context into parts to be worked upon to establish cause and effect and put back into a whole to generalise results (Tekin & Kotaman, 2013, p.82). However, schools are dynamic organisations with unique teachers and unique pupils. A cause-and-effect view of learning with education technology is reductionist and overlooks factors such as, motivation and language and the type of technology available in a particular time. Research already demonstrates that education technology does not involve a universal law around learning outcomes. Moreover, teacher's interactions with students are dynamic and complex, and cannot be stabilised or controlled in an experiment. An interpretivist view in contrast, would not provide practical solutions around change over time. Social constructionism is congruent with the aims of the research which views learning as a unique and participatory social process and schools as complex and

dynamic organisations where knowledge is created through language and transforms over time (Gherardi, 1999).

### 6.2.2 Present study epistemology of action research as a change process

It is held here that individuals construct their own views and therefore, it is assumed that there can be multiple realities (Karatas-Ozkan & Murphy, 2010, p.458). Learning is viewed as a social process of participation and co-production. This means that, during the process of research, stakeholders construct multiple realities around a social phenomenon. The solution-oriented approach is underpinned by social constructionist epistemology. Teachers' experience and perceptions of education technology were explored with the aim of developing new ways of thinking, seeing, and applying education technology (Harker, Dean & Monsen, 2017). The present study employed an action research approach because this allows an in depth, small scale view of the practicalities, and multiple realities around education technology implementation. Action research was also selected as it would provide a view of change over a period of time. The position of the current research aims, and questions are congruent with Reason and Bradbury (2011) suggestion that action research is, "an orientation to inquiry that seeks to create participative communities of inquiry in which qualities of engagement, curiosity and question posing are brought to bear on significant practical issues." (Reason & Bradbury, 2011, p.2). This also aligns with research which highlights the importance of collaborative, sharing cultures to facilitate education technology (Zhu, 2015, Divaharan & Cher Ping, 2010).

### 6.2.3 Research axiology

The research values the practicalities that enable human flourishing and assumes the most appropriate way to learn about social phenomenon is to collaborate with stakeholders as equal partners about educational life (Tekin & Kotaman, 2013, p.90). The author is a learner, who is flexible, reflective, and self-critical. The present study draws upon solution-oriented values to facilitate change in the use of education technology because "children, families, and schools, not only hold the secrets to the unravelling of their own difficulties, but also the resources by which to do so." (Rees, 2001, p.202). While the current

study includes a transformational change process it does include not hold transformative aims around culture and power (Mertens, 2007, p.216). An action research approach to inquiry that facilitates participation, engagement and curiosity is therefore most appropriate (Burr, 2015). As described by Reason and Bradbury (2011) it was important to remain flexible and facilitate a democratic research process. Teachers and particularly senior leaders in this project participated in decisions during the project to promote and capture 'flourishing' (Reason & Bradbury, 2011).

### 6.3 Research design

#### 6.3.1 Action research

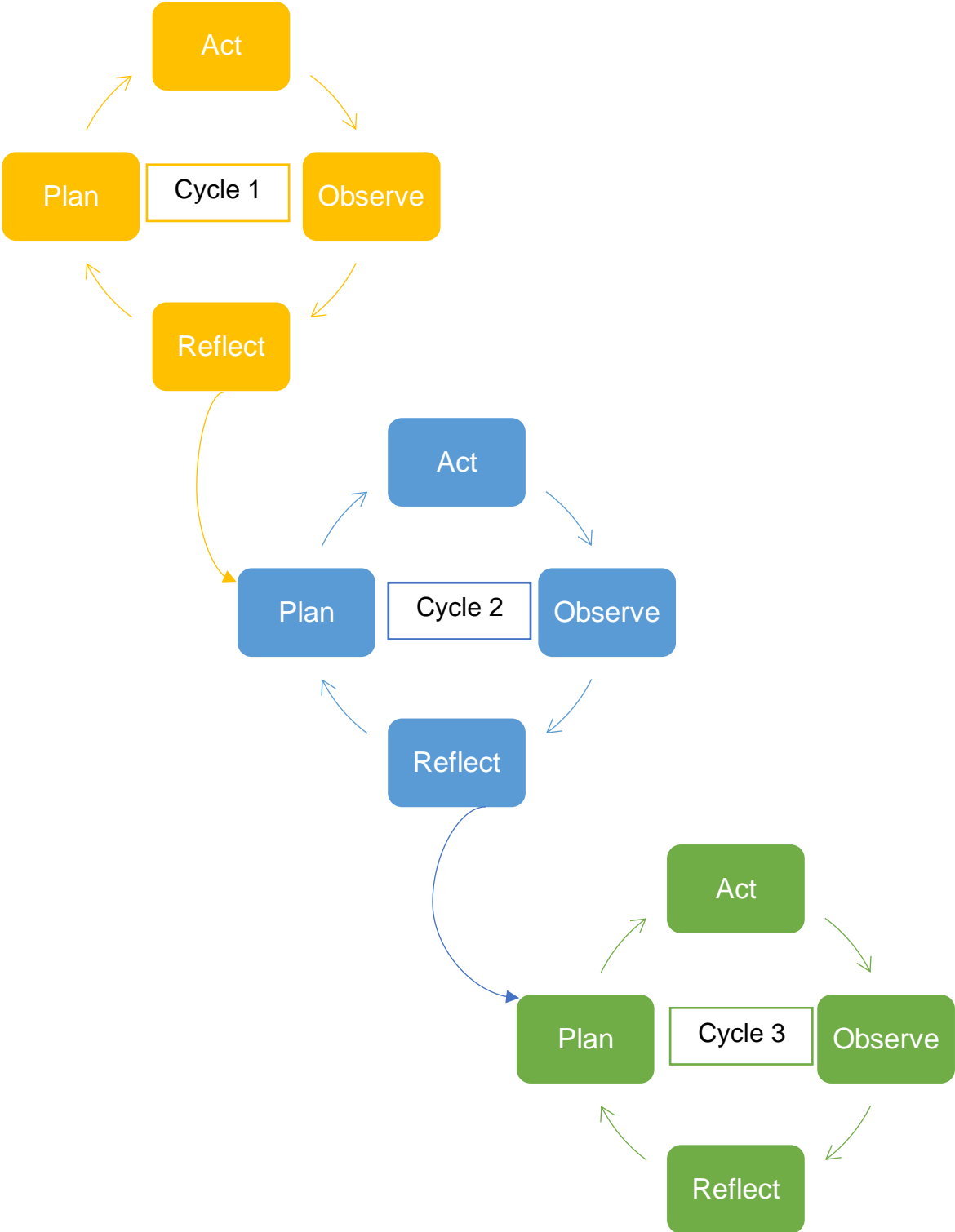
Lewin (1951) identified schools as an important context for action research so that social science methodology could be applied and theory evaluated (Adelman, 2006; Reason, 2006; Tekin & Kotman, 2013). Lewin (1951) proposes a model of action research which involves a democratic-participative, iterative process of action, evaluation, and further action. Newton and Burgess (2008) suggest there are three models of action research: emancipatory, practical, and knowledge generating and the decision to use a particular model is driven by the purposes of the research. Although action research may vary in the knowledge it seeks to explore, all action research is collaborative to a larger or lesser degree. Collaborative action research takes a democratic approach to influence positive changes in society. Action researchers value collaborating with different stakeholders because it is believed that by bringing together different perspectives, this could lead to a more holistic understanding of a situation and in turn more solutions (Cook, 2009).

Action typically progresses through a spiral of steps which involves acting, observing, and reflecting (McNiff, 2013). These typical cycles of actions are captured in Figure 1.5 page 81. Within these cycles, the researcher and co-researchers reflect and make sense of the situation, and as a result change could be taking place with individuals, groups, or organisations. Cycles may vary in duration, the time between cycles, and they may not follow a linear trajectory (Cook, 2009; McNiff, 2013). Reason and Bradbury (2011) suggest that the most important aspect of each cycle is to what extent the cycle of action provides



evidence to explain and justify any claims made. It is not surprising then that data collection within action research can evolve, and research questions and purposes may also change. Data collection methods can include interviews, surveys, journals, video, photography, observation, and questionnaires. Data collection often involves a triangulation process to widen perspectives, and this can also support claims around the research findings. The outcomes of action research may involve practical outcomes to improve a situation, new knowledge, bringing perspectives together, hearing different perspectives or starting a new inquiry.

Figure 1.5 cycles of actions



### 6.3.2 Other design considerations

Consideration was given around the extent to which the research questions and aims were evaluative, exploratory, or transformative. In doing so it is acknowledged that there are inequalities in educational opportunity and the research aims to improve outcomes for all, rather than a particular group of individuals. A narrative inquiry approach was considered; however, it was felt that this would not provide a balance to the individual and organisational story, and the opportunity to facilitate practical change with education technology. An appreciative inquiry (AI) was also considered; however, AI focuses on what currently works well, and arguably overlooks the change process and challenges experienced. With regards to education technology, previous research suggests that acknowledging and planning for practical challenges is particularly important with regards to implementation and an AI would not capture this (Stander, 2016).

### 6.3.3 Rationale for action research design

Action research is often employed in education research because it provides a rich, dynamic, context based participatory research process (Tekin & Kotaman, 2013). Some argue it also presents opportunities for teacher professional development (Simm & Ingram, 2008). Tekin and Kotaman (2013) suggest that by bringing teachers perspectives together in action research:

“Sharing ideas and striving for improvement creates synergy in the school and thereby positively affects its performance. This synergy also contributes to building a harmonious social atmosphere in the school.” (Tekin & Kotaman, 2013, p.89).

The research here seeks to explore how solution-oriented coaching can facilitate technology enhanced education. Dymek (2011) noted that action research cycles provide an appropriate methodology to understand the use of a new technology with the potential to leave the system stronger. Action research provides a means to explore realities and change at both an individual and an organisational level, and this is important to capture with regards to education technology as previous research suggests that barriers to implementation can

operate at the level of the individual including teacher experience and confidence (British Educational Suppliers Association Ed Tech survey, 2018; DfE, 2021b) and system, such as the technology infrastructure (Divaharan & Cher Ping, 2010; DfE, 2021b).

#### 6.3.4 Collaborative action research process to bring about change in the present study

In October 2021, an invitation to participate in the research was emailed to head teachers at schools in the NorthWest. Following an expression of interest, in November 2021 a meeting took place with a senior leader of the mainstream primary school. During the meeting, information about the school context was captured as well as the school's priorities around education technology. The first cycle of action took place in November 2021 and involved a group solution-oriented coaching session with all teaching staff. In the context of an increase in COVID-19, the second cycle of action took place in January 2022 and involved individual solution-oriented coaching sessions with teachers via Microsoft Teams. The researcher met with the senior leaders to share a strengths, weaknesses, opportunities, and threats (SWOT) analysis and agree the focus of the final cycle of action. The final cycle of action took place in February 2022 and involved a group coaching session with all teaching staff in the school setting. This was followed by a meeting with the senior leaders to share and agree the SWOT analysis and debrief. An evaluation the research trustworthiness and dependability are described on page 148.

### 6.4 Recruitment

#### 6.4.1 Sampling strategy

A purposive sampling strategy was used. Purposive sampling is often employed in qualitative research to address aspects of the research question (Cohen, Marion, & Morrison, 2017). The participants included mainstream primary school teachers and senior leaders. The author sampled participants from one school because research suggests that working with a group of teachers can bring further reflection, sharing and synergy (Cook, 2009, p.279; Tekin & Kotaman,

2013). Also, it would not be possible to complete the research with multiple schools or a secondary school because of the number of staff and pupils and research time constraints. The representativeness of one school as a wider population is not a critical concern because the author does not seek to generalise the findings without reference to the school's unique systems, pupil demographic, teacher perceptions and technology resources. Issues around sample size are not relevant to the research question, and the fact that the analysis does not rely on statistical methods.

#### 6.4.2 Inclusion criteria

The researcher is a trainee educational psychologist (TEP) working for a local authority educational psychology service (EPS) in the Northwest and so regularly works with educational settings. The decision was taken to not recruit schools with which the TEP was on placement as a link TEP so as not to create a conflict in roles as a trainee EP providing statutory advice and consultation. Adding to this, the TEP's prior knowledge of these schools could bias interpretation.

#### 6.4.3 Recruitment

Following attendance at a DfE Educational technology demonstrator school live webinar where interest was expressed in considering research into mediated learning experience and technology, a research information letter was sent to a Department for Education Educational Technology demonstrator primary school in the NorthWest. A meeting took place with the demonstrator school deputy head teacher (DHT) at the demonstrator school and they felt that the school already embedded technology within all classrooms and would not be able to add to the research questions. An expression of interest email was then emailed to head teachers at mainstream primary schools in the placement local authority (see Appendix G). Following an expression of interest, a meeting took place with the deputy head teacher at a mainstream primary school to discuss the research purpose, school context and time commitment required. The research information sheet was shared with school staff and consent was invited and captured on a written consent form (see Appendix H). Following consent, a copy of the finished

project in its anonymised form was shared with the school as well as with the educational psychology service.

#### 6.4.4 Recruitment meeting

During the first meeting with the senior leader, information was invited to understand the types of technology used in school and what the school was hoping to change with technology. Questions were also asked around the schools' demographic data to enable judgements around transferability.

#### 6.4.5 Research setting context

To give context, the following demographic and attainment information was collected. The setting is a single form entry primary school with 210 pupils in total and 8 teachers. A senior leader reported that there were 18 different languages spoken by pupils in school and 69 pupils eligible for free school meals. With regards to school attainment data, 45% of pupils in Key Stage 1 and 67% of pupils in Key Stage 2 achieved age related expectations in Reading in 2021. In writing, 33% of Key Stage 1 pupils and 70% of Key Stage 2 pupils achieved age related expectations. In maths, 50% of Key Stage 1 pupils and 63% of Key Stage 2 pupils achieved age related expectations.

#### 6.4.6 Education Technology resources

The technology resources available in school in November 2021 included 30 iPads and 22 mini laptops shared across the school and an Interactive Whiteboard and visualiser in each classroom. In February 2022 the setting bought Lenovo tablets. Further detail around the applications and websites used by teachers is presented in table 1.2 page 108.

#### 6.4.7 Participants

A total of 10 school staff participated in the research, including two senior leaders and eight teachers. Following written consent, each participant completed an individual goal setting form before attending a group coaching session (see Appendix I). The form was used to capture information around experience and

self-reported knowledge, confidence, and skills in using technology on a scale of 1 (a little), 5 (somewhat) and 10 (a lot). All staff reported using technology daily.

#### 6.4.8 Stakeholder engagement

The researcher is a trainee EP (TEP) on the doctorate in applied educational psychology at the University of Nottingham. The TEP shared the research questions, aims and final report with the host EPS service in the North-west of England. Although pupils and parents/carers from the participating school were not directly involved in the research, the project aimed to positively influence teacher and learning for all pupils.

### 6.5 Solution-oriented coaching procedures

#### 6.5.1 Introduction

The rationale for solution-oriented coaching is presented in literature review pages 72-74. The decision was taken to facilitate a group solution-oriented coaching session following discussion with the senior leaders. It was agreed that it would be helpful to bring perspectives together around what was working at a school level and discuss with participants how the coaching could helpfully look moving forward. Cook (2009) describes facilitating change in action research as leading, “participants into the ‘messy area’ and then supports them in moving forward within the mess, and with the mess, towards a ‘messy turn’.” (Cook, 2009, p.286). Sharing ideas and creating a collaborative culture is particularly important with regards to facilitating technology applications (Divaharan & Cher Ping, 2010; Zhu, 2015). Grierson, Gallagher, and Hilaire (2022)’s study found that sharing increased perceptions of efficacy and ‘camaraderie’. Following agreement with the senior leaders and teaching staff, the decision was taken to complete individual coaching following the group coaching session to provide an opportunity to focus on individual teachers’ needs. Previous research highlights that teachers value self-paced, personalised coaching and implementation planning (Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding & Guo, 2020; Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021; Hilaire & Gallagher, 2020; Grierson, Gallagher, & Hilaire, 2022; Zimmer & Matthews, 2022). The coach did

not act as a technology expert, the coach's role was to apply solution-oriented coaching principles to support teacher reflection, planning and to signpost to resources if requested (Hutchinson & Woodward, 2018).

The following procedures were developed by drawing upon a systemic solution-oriented model (Rees, 2017), GROW (Whitmore, 2002) and 'Solution' models of coaching (O'Connell & Palmer, 2018). The procedure described provides a flexible, semi-structured framework. At the end of each solution-oriented coaching session, teachers were provided with a visual summary of the coaching session to remind them of their solutions and strengths (Rees, 2001, p.210). The coach reflected on their skills, confidence, and competence in using solution-oriented coaching and this is presented in the research diary (See appendix B for further details).

#### 6.5.2 The role of the researcher as a psychologist in facilitating the coaching procedures

The following psychological theory and approaches were applied by the research acting as a psychologist coach during the group and individual coaching. The aim of coaching is to enhance an individual's belief in their capacity to create change and in turn enhance their commitment and action (Whitmore, 2010). To enhance motivation and collaboration, throughout the coaching process the researcher took a non-directive, person-centred approach. Rogers (1995) explains that a person-centred approach assumes that,

“Individuals have within themselves vast resources for self-understanding and for altering their self-concepts, basic attitudes, and self-directed behavior; these resources can be tapped if a definable climate of facultative psychological attitudes can be provided.” (Rogers, 1995, p115).

Rogers (1995) adds that there are three psychological conditions which underpins person-centred communication and that these conditions in the context of a helping relationship enables individuals to achieve self-directed goals. The three psychological conditions include genuineness, unconditional positive regard or acceptance, and empathic understanding (Rogers, 1995). The author



will describe how they acted as a psychologist and applied each condition during the coaching process. To convey and achieve genuineness, the researcher first prioritised developing rapport, trust, and collaborative alliance with the coachees (Egan, 2002). Each coaching process began with problem free talk to allow time for the coach and coachee to get to know each other, to give time for genuine connection and to understand what the coachee was bringing to the coaching process. The researcher accepted and received the coachees non-verbal communication with warmth through non-verbal nods and smiles and verbal positive comments. The researcher conveyed curiosity and enthusiasm verbally and non-verbally in response to coachee's ideas with mirroring, open questions, and positive feedback. Active listening was employed to attend to, clarify and verify details in the coachees preferred future, goals, and plan. Probing questions were used to clarify when and how things were experienced.

Empathy was conveyed by listening to and acknowledging the coachee's concerns, reflecting back, and summarising the coachee's views. The coachee's concern were received with open posture, eye contact and minimised gestures. Particular attention was paid to convey empathy verbally and non-verbally during MS teams coaching. Grondin, Lomanowska and Jackson's (2019) theoretical framework of empathy building in computer mediated interactions was applied. The web camera was positioned purposefully to ensure eye gaze through the camera and a visible upper body so that non-verbal communication was clear and mirrored. Check-ins were also used regarding the clarity of the audio and visual, and evaluation of the collaborative alliance was invited following the online coaching to capture any potential negative influences of online interactions on the coaching process. Although it was not anticipated that the coaching process would evoke difficult emotional responses, the researcher was ready to manage and contain emotional responses with sensitivity.

With regards to facilitating effective group working, the researcher applied knowledge of group dynamics. The researcher was aware that there could be normative, social identity and informational influences on group sharing and decision making, and that the group or individuals may engage in defensive reasoning (Abrams & Hogg, 1990). To facilitate effective group working ground

rules were agreed and outlined at the beginning of each coaching session. During the coaching process, the researcher attended to the functions of the group coaching process by following the group coaching procedure with integrity while also maintaining the functioning of the group, by gatekeeping and encouraging the participation of all group members (Schein, 1999). The researcher applied knowledge of systems, change and groups by asking questions about the school and classroom system, such as, what happens when a particular technology is used and what is the evidence around how this is experienced by different members of the system, including teachers, pupils, and parents (Lewin, 1951).

The researcher drew upon the psychological theory outlined on page 37 to facilitate and interpret the coaching process and outcomes. The researcher reflected on where coachees appeared to be on the stages of change cycle (DiClemente & Prochaska, 1998) and what could enhance their self-efficacy (Bandura, 1977) and self-determination (Ryan & Deci, 2000). These reflections guided the researcher's questioning in the context of the solution-oriented coaching framework. In summary, the researcher employed psychological theory and interactive communication skills to listen and responding effectively to coachees during group and individual coaching sessions. Information regarding collaborative alliance evaluations and observations of the researcher coaching are presented in the analysis and discussion chapter.

### 6.5.3 Group solution focused coaching procedure

The following framework was applied with the teaching team in November 2021. The researcher presented a Microsoft Power Point Presentation on the interactive whiteboard to introduce the aims of the research, and to present solution-oriented questions and scaling (see Appendix J). The researcher recorded ideas onto a flipchart, and this was displayed and referred to throughout the session. During the coaching session the researcher acted as a psychologist by attending to and facilitating the task functions of the coaching session, such as, opinion seeking, clarifying, elaborating, summarising and consensus testing and maintaining group relationships, such as, gatekeeping and encouraging contributions.

Participants were welcomed to the meeting with introductions and problem free talk. The group coaching session began with an introduction to the researcher and positioning the aims and purpose of action research and technology (that the purpose of the research is not to look at technology deterministically, rather to draw upon what is already working). The researcher reflected that teachers are a skilled problem-solving force and technology at times can feel complex. The researcher explained that the coaching involved starting from a place of strength and the purpose of the session was to come together to think about what is already working, what is the school vision for technology, what are the next steps and how will the school get there. The researcher presented the consent form, including how the data was anonymised and used. The researcher invited participants to comment and ask any questions. The researcher reminded participants that they can withdraw from the study and the researcher's contact details were provided.

Following participant consent, the participants were invited to complete the individual goal setting form. The researcher described the coaching session as a process that can raise individual's awareness of their skills, strengths, and pre-existing solutions. The group was invited to agree ground rules for the discussion. The coaching session flowed through the following steps:

- What is working well around education technology in school?
- Where do you want things to be?
- Where are you now? What steps will we need to take to get to a 10? (a visual scaling line will be used)
- What obstacles might come up? What will help you to overcome these?
- Time to reflect on where we want to be as individuals.

The coaching session completed with a round of words to capture views of the coaching process, and comments, questions and reflections were invited. The group coaching session concluded with the debrief procedure presented in Appendix K.

#### 6.5.4 Individual solution-oriented coaching procedure

In the context of COVID-19 restrictions, the researcher agreed with the teachers to complete the individual coaching sessions via Microsoft Teams. The researcher attended the meeting using the remote working guidance. Five class teachers joined the sessions using a laptop in school and one class teacher joined from home as they were self-isolating. Research shows video calls can create comfortable, engaging, and convenient discussions (Dodds & Hess, 2021), and can work well with online coaching for teachers (Matsumura, Correnti, Walsh, DiPrima Bickel & Zook-Howell, 2019). The researcher was a digital champion for the local authority which involved supporting colleagues in the migration from Skype to Microsoft Teams (MT). The researcher therefore had experience and confidence in using MT including, setting up, sending invites, and using the screenshare function as part of university and placement activities.

The following structure was drawn during the individual coaching session but was used flexibly to ensure an authentic, democratic coaching process. The session began with problem free talk and checking MT visual and audio synch. Teachers were advised that it is their personable preference to have the camera on or off and the parameters for the meeting were agreed (30 minutes duration approximately). The purpose of the research was revised along with participant consent and right to withdraw. The teachers were reminded about the coaching approach and invited to ask any questions. With the teacher's consent, the audio recording began and the following questions were used:

- How will you know this meeting has been useful to you?
- What do you hope to take away from this meeting?
- What has changed?
- What is working?

The scaling line the teacher completed in November on the individual goal setting form was presented on screen. The teachers were invited to look at where things were and consider, where did they want things to be, what number is that and what next steps will move things along, and what will help you get there (see Figure 1.6 page 92). The closing sequence involved checking that the plan reflected the discussion and provided a realistic and achievable plan. This was

followed by giving positive feedback about the individual's strengths, highlighting areas of success discussed and how these will be furthered in the plan. The teacher was then invited to comment, give reflections, and ask questions. This was followed by a debrief (see Appendix K). Each teacher was emailed a copy of their new scaling line with their new goal, next steps and things that will help. An example outline of this is presented below, knowledge, confidence and skills is presented as KCS and teachers were invited to scale these.

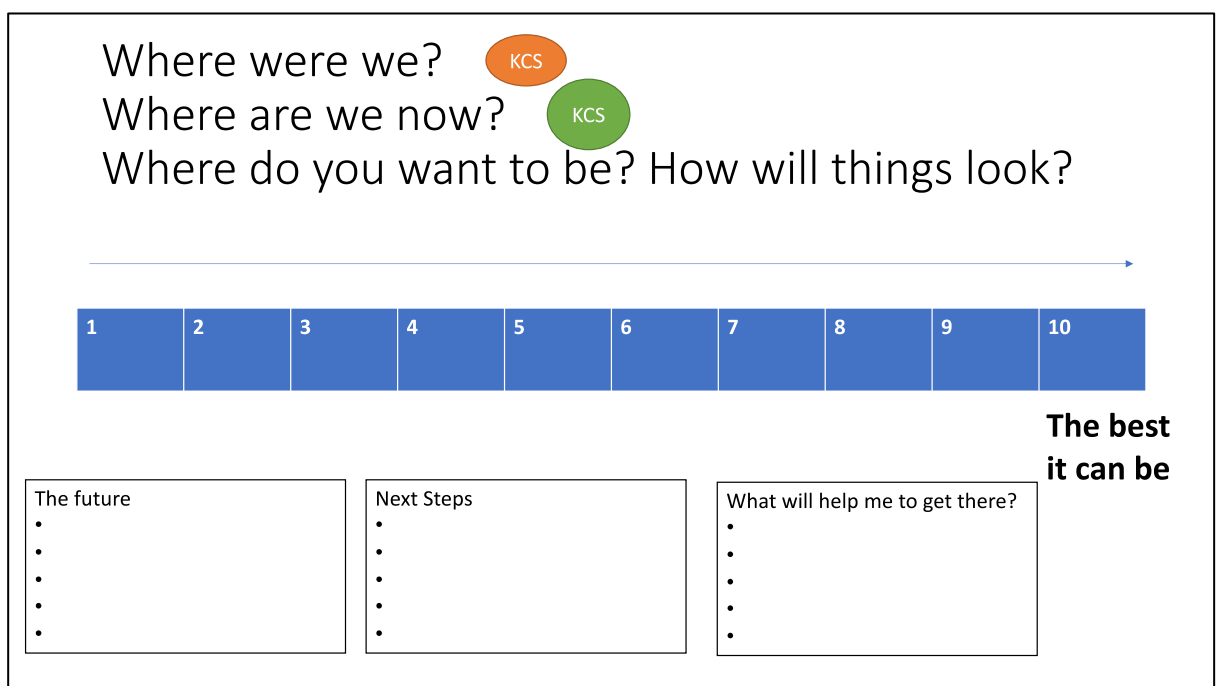


Figure 1.6 outline of the Microsoft Teams individual coaching scaling and goal visual

### 6.5.5 Data collection

According to Grant (2014) it is useful to draw upon qualitative and quantitative measures such as, goal attainment scaling to measure progress towards goals during organisational change. For this reason, prior to the coaching sessions, each teacher completed an individual goal setting form to capture experience and skills, knowledge, competence, and confidence in using technology and hoped for goals. Qualitative data was collected using semi-structured coaching sessions with staff, this included visual scaling lines and audio. The school followed their usual procedures in the safe use of technology and storage of information. The coaching sessions were recorded using a Dictaphone. The audio was stored

following GDPR guidelines and only the psychologist listened to and transcribed the data. The audio data was deleted following transcription. At all stages of the research, the local authority guidance on remote working was followed (See Appendix L). The qualitative and quantitative data collection is summarised in Table 2 page 105.

#### 6.5.6 Collaborative alliance evaluation

To provide some transparency and evaluation of the coach’s approach and influence of individual coaching via MS teams, a collaborative alliance evaluation questionnaire created by Adams (2016, p.187) to evaluate coaching in schools was emailed to each teacher following the individual coaching session (see Table 1.7 below). The email included the following:

‘With regards to the solution-oriented coaching session, please rate the following. Thank you for taking the time to complete the questionnaire.’

Table 1.7 Collaborative Alliance Evaluation Questionnaire (Adams, 2016, p.187)

	<b>Strongly agree</b>	<b>Agree</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
We had a good rapport.				
We discussed goals I wanted to work towards.				
I got the sense we were 'on the same page'				
The things we did were helpful.				

#### 6.5.7 Observation of coach framework

An observation framework was employed to identify the coach’s strengths and areas of development. The coach was observed during two individual coaching sessions by a qualified educational psychologist and a lead specialist educational

psychologist. The observer was asked to comment on the solution-oriented principles framework. This framework was taken from O'Connell, Palmer, and Williams (2012).

## 6.6 Data Analysis

### 6.6.1 Strengths, Weaknesses, Opportunities, Threats (SWOT) analysis

Although the origin of SWOT analysis is unclear, it is used widely in business and education as a tool that can facilitate strategic analysis and planning (Helms & Nixon, 2010). A SWOT analysis involves looking at the data to identify facilitating (strengths and opportunity) and inhibiting factors (weaknesses and threats). These factors can operate internally and externally to the organisation. According to Leigh (2006) strengths and weaknesses are within the organisation's control and opportunities and threats are not. To consider how to enhance strengths and target inhibiting factors, SWOT analysis typically involves categorising the SWOTS in a two-by-two table like Table 1.8 below. A SWOT analysis can take place during or after a program to evaluate change over time (Leigh, 2006). It is assumed that by exploring the facilitating and inhibiting influences in and around an organisational issue, this could lead to a deeper understanding of strengths as well as identifying new opportunities (Helms & Nixon, 2010). The data collection and SWOT analysis is summarised in Table 2 page 105.

Table 1.8 A table to show SWOT analysis matrix

Strengths	Weaknesses
Opportunities	Threats

### 6.6.2 Rationale for SWOT

The project draws upon Lewin's (1951) field theory, group dynamics and action research (Burnes, 2004). A SWOT analysis presents an opportunity to identify 'forces' which could be enhanced or changed to facilitate teachers' applications of technology (Burnes, 2004). A SWOT analysis therefore aligns with the research aims and questions which seek to explore how a solution-oriented coaching framework can facilitate teachers' applications of education technology. The SWOT analysis captured strengths, weaknesses, opportunities, and threats around applications and supported further planning and evaluation of education technology.

### 6.6.3 Limitations of SWOT analysis

SWOT analyses are criticised with regards to its simple and vague methodology (Helms & Nixon, 2010). On the other than, the simplicity of the approach could be viewed as a strength in the current design because naming the SWOTs facilitates practical change and a clear view of change over time. SWOT analysis can be enhanced with thorough descriptions of SWOTs and member checking of the SWOTs. For this reason, detailed notes were taken around the SWOTs and each SWOT was member checked with the senior leaders to check the accuracy. SWOTs are also criticised because they provide a snapshot of an issue at one time point, and this is a limitation because SWOTs may change over time (Helms & Nixon, 2010). For this reason, the decision was taken to complete two SWOTs to provide information around the change process. SWOT analysis reduces a complex social context with many interacting factors into labels. It is therefore acknowledged that some issues and strengths may have been missed in the analysis.

SWOT analysis does not capture the individual experiences which could be positively or negatively influencing the success of an initiative (Helms & Nixon, 2010). For this reason, the decision was taken to conduct two levels of analysis at the group and at the individual level. The SWOTs were triangulated with detail provided by teachers during the individual coaching session and quantitative



analysis of group change. Finally, SWOTs are sometimes criticised for providing minimal information with regards to, if or how the stakeholders can influence the SWOTs identified (Helms & Nixon, 2010). It could be argued that the solution-oriented coaching approach overcomes this criticism to a degree because the coach checked in with teachers with regards to what is working, what is not working and what would a realistic plan of change need to involve. Member checking of the SWOT analyses also provided another opportunity for teachers to act upon the SWOTS and plan education technology implementation.

#### 6.6.4 Alternative analysis considered

A thematic analysis of the data to capture themes around the change taking place around education technology implementation was considered (Braun & Clarke, 2006). However, surveys highlight evidence of variation in teacher confidence, skills, and uses of technology (DfE, 2021b). The senior leaders shared that an important outcome for the school included consistency in teachers' uses of technology in teaching and learning. A thematic analysis would not capture rich detail around individual teachers' experiences of education technology. Moreover, a thematic analysis would not provide practical information at each cycle of action to facilitate change. Sociocultural Activity Theory as a developmental framework to interpret the findings was also considered (Engestrom, 1987). In such a framework, technology could be viewed as the 'artefacts' or 'tools' to enhance education, the school setting could be viewed as a community with 'rules' and 'division of labour' in using technology, and from these tensions and contradictions could be identified so that steps could be planned (Engestrom, 1987). However, the research does not aim to explore the influence of culture or define the subject as either the group or individual, rather to study change at both levels.

#### 6.6.5 Procedure for SWOT analysis

The audio recording of each coaching session was transcribed in full using a playscript format. Extracts are presented in the findings chapter to evidence the coaching process. The author used the descriptors and framework presented in

table 1.9 below to identify SWOTs. The transcript was read from start to finish. The data was then read again and then highlighted and transferred SWOTs into the framework above. This process was repeated some weeks later to ensure SWOTs were identified. A summary of each group coaching session was created, and this was shared and discussed with the senior leaders to member check.

Table 1.9 Group solution focused coaching SWOT framework

<b>Strengths</b>	<b>Weaknesses</b>
<i>What is positive/helpful about the education technology in school? How does it influence learning?</i>	<i>What is challenging about using technology? How is it not helpful?</i>
<b>Opportunities</b>	<b>Threats</b>
<i>Where are the opportunities to use more or different technology? What are the facilitators?</i>	<i>What are the barriers to using technology?</i>

#### 6.6.6 Analysis of individual coaching

Teacher confidence, agency and lack of training is reported as the most common barrier to using technology (British Educational Suppliers Association EdTech survey, 2018; Strawbridge et al., 2018; DfE, 2021b). The technology acceptance model suggests that perceptions of education technology including ease of use and attitudes, self-efficacy, subjective norms, and individual differences such as, age and teaching experience can influence applications (Scherer, Siddiq & Tondeur, 2019). To capture the teachers' perceptions and changes in confidence a description of each individual coaching session is outlined to capture what

changed in practice, what was working, their goals and solutions to working towards this. A summary of changes in teachers' self-ratings of knowledge, confidence, and skills is captured to illustrate change in the context of the project. The decision was taken to analyse the individual coaching session with reflections from the psychology of coaching outlined in the literature review page 35 and with quantitative analyses of the teacher's self-rating change. A detailed description of the individual sessions with reflections on the psychology underpinning the process adds depth and possible interpretations of the change.

## 6.7 Ethical considerations

Research ethics is defined as “the moral principles guiding research from its inception through to completion and publication of results.” (BPS, 2021, p.5). There was ethical consideration of the design, implementation, and analysis of the research by drawing upon guidance from the British Psychological Society Code of Human Research Ethics (BPS, 2021), the British Psychological Society Code of ethics and conduct (BPS, 2021b), the Health and Care Professions Council standards of proficiency (HCPC, 2016), conduct, performance, and ethics (HCPC, 2016), and the University of Nottingham Ethical Checklist. A university of Nottingham ethics application was completed (see Appendix M). The ethics application was later amended to include a focus on solution-oriented coaching and this application and approval is presented in Appendix M. Details are provided below about how respect for the autonomy, privacy and dignity of the teachers was enacted.

### 6.7.1 Valid and informed consent

During the first group coaching the teachers were informed of the research aims and solution-oriented coaching framework through a short presentation. Informed consent was invited and documented with the consent form. At the beginning of the individual and final group coaching, the teachers were reminded of the aims of the research and solution-oriented framework used.

### 6.7.2 Right to withdraw

During the introduction to the research and in the information sheet and consent form, the teachers were made aware that they were able to leave the study at any time. The teachers were also reminded of their right to withdraw at the beginning and end of each coaching session.

#### 6.7.3 Confidentiality, anonymity, and data storage

The teacher's data was treated confidentially and remained anonymised, including protecting the identification of the school setting. The coaching session was recorded on a portable dictaphone. The data was transcribed immediately following the coaching session and this was stored securely in line with data protection guidance. The audio files were then deleted from the dictaphone.

#### 6.7.4 Maximising benefit and minimising harm

With regards to risk, it was not anticipated that the research would cause any distress or harm as the research did not involve events outside of typical classroom routines. A collaborative and professional relationship with teachers was formed (further details are provided in the findings chapter). The timing of the coaching was agreed at a convenient time for the teachers.

#### 6.7.5 Debriefing

The teachers were provided with a debrief to inform the teachers of the outcomes and any unanticipated events following each coaching session. A summary of the group coaching and the SWOT analysis was emailed to the senior leaders. A copy of the individual coaching scaling was also emailed to each teacher following the coaching session.

#### 6.7.6 Scientific integrity and social responsibility

Supervision with the author's academic tutor was employed to ensure the quality of the research. The coach had experience in using solution-oriented principles in working with schools and two observations of the coach were used to evaluate the competence and quality of the coaching session. The aim of the research is

to add the evidence base around facilitating change in schools particularly with regards to technology use in schools and this was transparent to stakeholders.

#### 6.7.7 Summary of methodology

In this chapter the research ontological and epistemological position was outlined. The research questions are positioned within the social constructionist paradigm with the aim of supporting positive change. The action research process was described, and alternatives considered. The solution-oriented coaching procedures were illustrated and a rationale to employ SWOT analysis was provided as the most appropriate means to capture change over time with supplementing individual goal setting and coaching description. The following chapter turns to the analysis and discussion of the project findings.

## 7 Analysis and discussion

### 7.1 Overview

Cohen, Manion and Morrison (2007) suggest five ways to present data in qualitative data analysis, by groups, individuals, research question, problem, or data collection. The analysis is presented in chronological order of action so that readers can see how the cycles of action and change progressed. An overview of the cycles of action are presented in figure 1.7 page 103 and a data collection summary is presented in Table 2 page 105. The group and individual coaching sessions are outlined and reflections on the change process are discussed in relation to the literature. The changes observed are discussed in the context of the aims of the research and research questions. This is followed by a description of the research's contribution to literature and reflections around the research aim are offered. Critical reflections of the research quality and limitations, and suggestions for future research are proposed. The chapter concludes with implications for educational practitioners.

Figure 1.7 Analysis cycles of actions summary

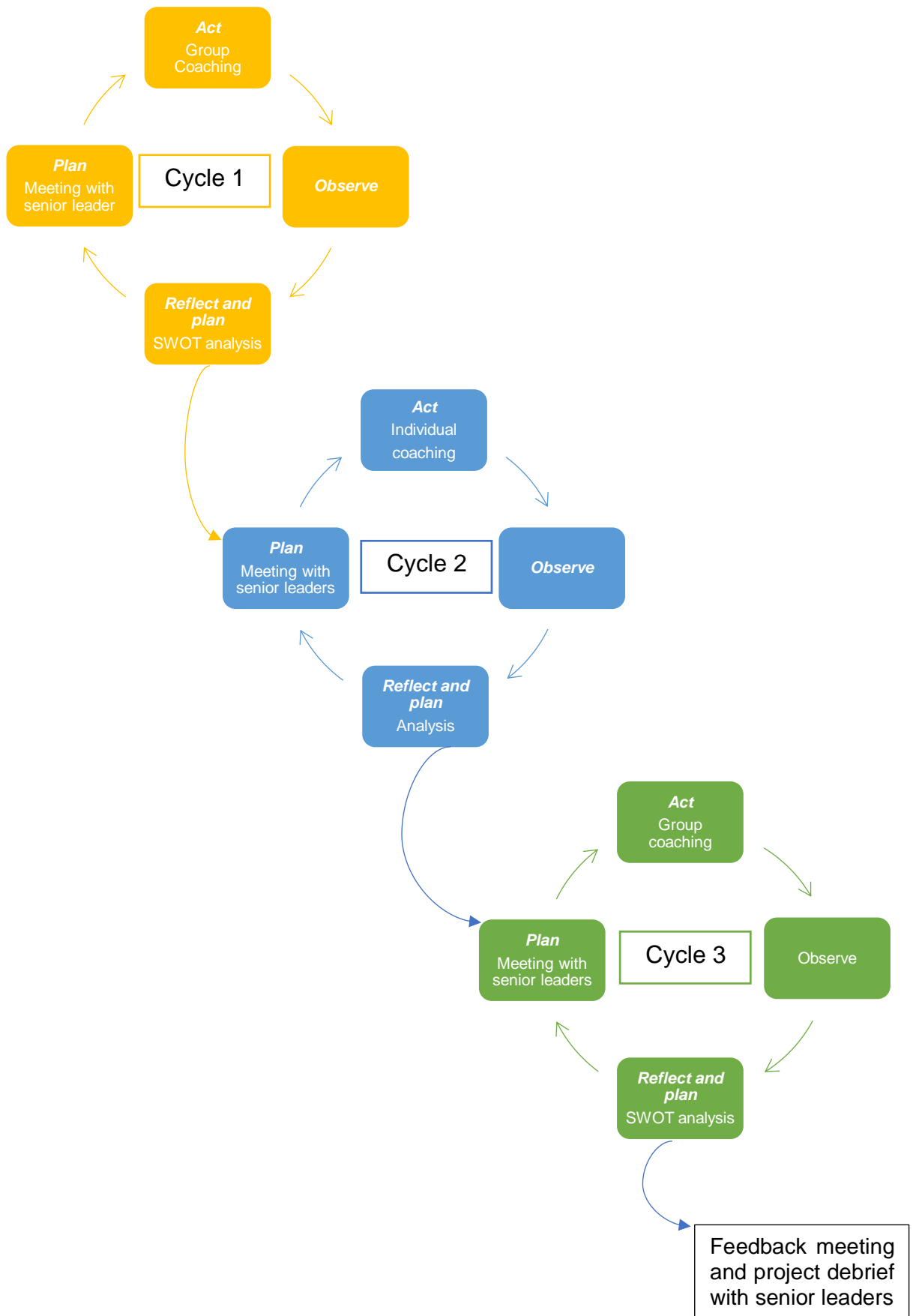


Table 2 Data collection summary

<b>Cycle</b>	<b>Action</b>	<b>Purpose</b>	<b>Location</b>	<b>Data collected</b>	<b>Analysis</b>
<b>Cycle 1</b>	Individual goal setting form one	To baseline teacher's K, C, S and goals	In school	Questionnaire	n/a
	Group coaching	To identify a shared vision and action plan to facilitate organisational change.	In school	Audio of the coaching session and scaling response	SWOT analysis
	Round of words	Evaluation of the coaching process	In school	Round of words	Summary
<b>Cycle 2</b>	Individual coaching	To identify individual goals and action plan	MS Teams	Teacher's goal scaling figure	Reflective commentary
	Collaborative alliance evaluation	Evaluation of the coaching process	Email	Questionnaire	Summary
<b>Cycle 3</b>	Group coaching	To evaluate change since the first group and create next steps.	In school	Audio of the coaching session and scaling response	SWOT analysis
	Individual goal setting form two	To evaluate change in individual	In school	Questionnaire	Descriptive statistics.



		teacher's knowledge, confidence, and skills from the beginning of the project			Calculation of average change in knowledge, confidence and skills using goal setting forms one and two.
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## 7.2 Cycle one

### 7.2.1 Planning meeting one

The teachers have been given a pseudonym to protect anonymity, the senior leaders will be referred to as Lydia and Rheanna. Lydia reported that staff are enthusiastic about education technology and needed support around their confidence and skills in using technology. It was explained that the school improvement aim was to increase how education technology is used by all teachers to enhance learning and to have 'consistency' in teacher's applications. In October 2021, the school introduced Microsoft Teams (Teams) for homework. Each classroom had an interactive whiteboard and there were 30 iPads and 12 mini dell laptops shared across the school (typically by emailing colleagues). In October 2021, Lydia applied for further funding to buy more devices for the school. It was agreed that the research aims, and questions aligned with the school improvement focus around facilitating change in applications of technology. The first cycle of action involved a group solution-oriented coaching session with all staff because Lydia explained that it would be helpful to bring colleagues together to introduce the project and to see where things are in terms of current applications.

### 7.2.2 Group solution focused coaching SWOT analysis

A group coaching session took place in school on the 10.11.2021 with the senior leaders and eight teachers. A Power Point presentation (see appendix J) and flipchart paper was used to facilitate the process. A summary of the coaching session is presented in appendix N and a summary of SWOT analysis one is presented appendix O. The summary of the coaching session and SWOT analysis was shared with a senior leader at a second planning meeting to member check.

#### 7.2.2.1.1 Strengths: What was positive/helpful about the education technology in school? How did it influence learning?

The teachers shared examples of the applications and websites they used and how they enhanced learning. Education technology applications were reported to

enhance modelling, engagement, and assessment. Most teachers shared that the visualisers were helpful to share work and Mark and Simon also used the mirroring function on the iPad to share work. The teaching staff agreed that the pupils were motivated to use the interactive whiteboards, such as, coming up to the board to answer a question. There was also agreement with Jane who said that pupils '*...get fed up of hearing our voices sometimes*' and that using videos when modelling helps the pupils to listen and attend to the teaching input. Mark shared how they sometimes complete assessment with 'Kahoot'. Mark explained that Kahoot gave him assessment information quickly in one place and presented an opportunity to '*complete assessments in a different, more engaging way as well, rather than just giving them a test*'.

Applications of education technology enhanced learning in maths and literacy particularly. With regards to applications in maths lessons, Simon and Joanne agreed that 'ITP's', an online resource was helpful in modelling concepts in maths. Three key stage two teachers talked about the website, 'Times Tables Rockstars' (TTRS). It was explained that using this website was motivating for some pupils, facilitated distributed practice and that '*children bring this knowledge into maths lessons*'. Joanne added that the variation in the application TTRS helped learning because '*it's not just got the times tables it's got the division facts and the missing number sentences*'. Rheanna, who was previously a key stage 1 teacher shared how the online game '*Hit the button*' in contrast to TTRS '*it's just right for their age*' in key stage 1 and worked well because it's '*easy to use*'. With regards to literacy, applications including 'Racing to English' and 'IDL' was reported to be working well to support some pupils in literacy because '*the learning is differentiated to the children's level*' and the applications provide assessment information. Lydia explained that 'Read Write Inc' which includes online videos of modelling helped overlearning and supported home learning. Lydia added that some parents gave positive feedback about the 'Read Write Inc' website. All staff reflected that 'Purple Mash' was a '*rich resource*' and this worked particularly well in supporting learners at home during COVID-19 school closures. Finally, Lydia shared that the school 'Facebook' page and website worked well to share information with families.

#### 7.2.2.2 Weaknesses: What was challenging about using technology? How was it not helpful?

Teachers found it challenging to have time to practice and organise technology resources, some resources were unhelpful, and pupil confidence and fluency with devices was reported to reduce learning time. Teachers varied in how and how often they applied technology, and this was reported to be a weakness. None of the teachers were using the 15 mini laptops in school and teachers did not share practice around their technology applications. Simon explained that it was difficult to make time to practice and organise technology resources across school, particularly when classes had different break times (a COVID-19 measure to reduce transmission in school).

Some of the technology resources were reported to be unhelpful, for example, the Kindle screens were said to be *'too small'*. Some intervention applications on the iPad, such as, 'Reading Eggs' had a limited number of users and were therefore accessible to a limited number of pupils. The website 'My Maths' and the grammar resources on 'Purple Mash' were reported to add little to enhance learning. Joanne and Simon noticed that their classes were *'losing interest'* in 'Times Tables Rockstars' and were no longer using the resource. Teaching staff reported variation in pupil fluency and *'resilience'* in using technology. Sarah explained that pupils are *'over familiar with technology but not in the way we want them to use it'*. Joanne, Simon, and Mark agreed that pupils are familiar and confident playing games and watching videos on YouTube but not navigating a device. The teachers felt that a lesson could become a *'login lesson'* or that some pupils would 'give up' if they had a problem using a device.

#### 7.2.2.3 Threats: What were the barriers to using technology?

Barriers to using technology included organisation of resources, time to practice, confidence, knowledge of resources available and problems with a device or resource. The teaching staff reported that there were not enough technology resources in school, some resources were unreliable and lost charge, and some headphones didn't work. The iPads also held different applications and so staff did not know which iPads they needed for a particular application. Mark shared that, *'you have this wonderful idea planned and then it all crumbles because those*

*5 won't do this and these can't do that and then it descends into chaos*'. Two teachers agreed and shared similar experiences where this happened. As a result, the teachers did not plan to use the resources as much as they would like to. The school had a limited amount of funding available to buy technology resources and the expense of the resource limited how many resources could be purchased.

Joanne and Sarah reported that their confidence and not feeling skilled created challenge when using technology. The teachers shared that they were not aware of or had forgotten about the technology available in school, such as, 'IDL' (International Dyslexia Learning Solutions Limited), 'racing to English' or the laptops. Some pupils lost their passwords for Teams and were then unable to access home learning activities. The teachers felt that the problems with passwords for home learning was *'putting parents off'* using technology and that parents/carers did not know how to use the new school communication application 'Ping'.

7.2.2.4 Opportunities: Where were the opportunities to use more or different technology? What were the facilitators?

Following the discussion, the teachers' identified solutions to the challenges and barriers identified. The senior leaders planned to buy more iPads and teachers agreed to create a timetable around using iPads in the morning. A request was going to be made for a technician to install all applications on all iPads, and it was agreed this this could facilitate use. There was agreement that if teachers knew when the resources were available, they could increase how frequently they used the resources. Mark added that using the iPads more could help the teachers to model resilience, and this could help the pupils to feel more confident. Sarah suggested practising and sharing how they use technology during staff meetings, and that this could help teacher's knowledge and confidence. Joanne suggested re-introducing *'battles'* around 'Times Tables Rockstars' and that this could boost engagement with the resource as this worked well previously. Similarly, Simon proposed a *'re-launch of Numbots'* as this was introduced during a school closure. To remove barriers to home learning, Rheanna suggested pupils save their Teams passwords in their reading records. At the parent drop-in session

and parents evening, Katie suggested that teachers could model how to use 'Ping' and Teams.

### 7.2.3 Reflections on the group coaching change process

The solution-oriented coaching process helped teachers to create a shared vision around how they wanted applications in education technology to improve in school (Rees, 2017). This is an important change because a shared vision is reported to contribute towards a culture that facilitates educational technology applications (Zhu, 2015). The shared vision aligned with teachers' views around the role of education technology to support pupil engagement and learning. This alignment possibly explains why the teachers were motivated and enthusiastic towards making change (Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021). Starting from the teachers' views about education technology provided a helpful platform for change. This was important as Liao, Ottenbreit-Leftwich, Glazewski and Karlin (2021) found that if the education technology practice did not fit with the teacher's pedagogical beliefs, they were less likely to implement the technology.

The solution-oriented principles facilitated change as exceptions and strengths were identified. Through the process of sensitisation and amplification, the coach reminded and increased the teachers' awareness of their resources and strengths and amplified what was going well (Cavanagh & Grant, 2010; Harker, Dean & Monsen, 2017). The teachers also started to comment on their strengths, for example Rheanna said that *"everyone's got their skills in doing different stuff"*. After looking at what was working well, Sarah reflected that *"this is more than I initially thought"*. Similarly, during the scaling question Joanne shared, *"I think we're higher than a 7 look at all this stuff were doing"*. By the end of the session the teachers created an implementation plan. The teachers shared that the process was 'reflective' and created 'realistic goals'. By amplifying what is already working, the teachers' collective energy and efficacy appeared to increase. This is a helpful change because motivation is reported to involve energy (Ryan and Deci, 2000).

It seemed that the ground rules, school culture and supportive leadership facilitated sharing and the creation of new solutions during the coaching process as all views were invited and respected, and variations in confidence was acknowledged sensitively (Harris, 2002). According to Harris (2002) collaborative school cultures create the necessary conditions and relationships for change because this helps colleagues to trust each other and this in turn facilitates more sharing and innovation (Harris, 2002, p.13). These were reflected in the ground rules for the coaching process agreed at the beginning of the session. Rheanna reflected that *'we very much all give our own and share ideas and things...there's no such thing as a silly question...we're mindful that some staff have been here longer than others, so we don't assume that everyone knows everything'*. With regards to ideas and questions, a teacher shared that *'they're all respected'*. During the process, some teachers discussed their confidence and wanting to feel 'skilled'. Joanne shared that they *'felt like a caveman'* and Sarah said that they *'felt stupid'* when trying to apply technology in the classroom. Lydia responded that *'we need to make sure everyone's confident on it don't we so everyone can use it'*. It is important that teachers feel confident in using technology as this is a common barrier to application (British Educational Suppliers Association EdTech survey, 2018; Strawbridge et al., 2018; DfE, 2021b). The round of words is presented in Figure 1.8 page 111 and included words such as 'helpful', 'supportive' and 'encouraging'. This suggests that the staff valued having time to talk to colleagues and felt supported.

The action plan included changes in the school's hard systems, including ordering more devices, as well as changes in the soft systems as teachers planned to share practice (Rees, 2017). For example, two teachers asked a colleague if they could show them how to use the mirror function to share work from the iPad. Teachers shared that the process was 'worthwhile', 'inspiring' and 'informative' as teachers increased their awareness of the technology available and how other teachers were applying technology.



Figure 1.8 Group coaching round of words

Current applications of education technology reported during the coaching session reflected the DfE (2021) finding that most primary school teachers use interactive whiteboards and tablets but that there is variation in application (DfE, 2021b). Types of application include technology-enhanced management of teaching with online learning at home with RWI, Purple Mash and Teams (Passey, 2019). Current applications also included technology enhanced learning whereby technology enhanced assessment, differentiation, distributed practice, and modelling (Passey, 2019). The teachers shared that the outcomes of education technology application included pupil engagement and motivation (Squire, 2006) and that pupil's brought the skills they practice d on an online timetables game into the lesson. Teachers considered the developmental needs of learners when deciding which technology to use, such as, using 'Hit the button' in KS1 and TTRS in KS2. In line with previous research, teachers reflected that there was variation in pupil competences in using technology and this created challenge (Bailey & Snowden, 2021; DfE, 2021b). Teachers also discussed current limitations around some applications and created solutions based on what worked previously, such as, re-launching class battles. It was therefore helpful to



hear 'pain and possibility' because new solutions were identified following discussions around the pain in pupils' reduced interest in some applications (Rees, 2017).

Weakness and threats to education technology application included time constraints, cost of resources, knowledge of technology available and access (Koehler & Mishra, 2013; Milton, 2015; EEF, 2019). The technology acceptance model suggests that teachers' applications are influenced by perceived usefulness, ease of use and attitudes, self-efficacy, subjective norms and facilitating conditions, and individual differences such as, age and teaching experience (Scherer, Siddiq & Tondeur, 2019). The teachers reported variation in their application and that some devices did not work, and this could create 'chaos'. Teachers also reported that they weren't sure which devices they needed or when they were available, and this meant that some education technology was perceived as unhelpful, and teachers avoided using it. Sarah also explained that it is difficult to have *"...time to get together with people isn't it because we're all so busy with our jobs"*. In response to the miracle question Lydia reflected that, *"some teachers might just be getting on with it because they're really confident with it and then we forget that maybe other teachers don't know about that so it's remembering that we're all sharing and supporting each other I suppose in using those Apps"*.

While the senior leaders were visible in their expectations around technology, the problems around resources appeared to create a contradiction and tension in the school activity system (Divaharan & Cher Ping, 2010). Coming together as a group provided a helpful opportunity to discuss taken for granted assumptions around what is available, and what is and is not working around education technology, and how the teachers could share and support each other more (Lewin, 1951). This is important because collaboration and a shared vision around goals are shown to enhance the implementation of technology (Zhu, 2015).

#### 7.2.4 Cycle one summary and conclusions

The SWOT analysis identified weakness and challenges around applications, including organisation of resources, time to practice, confidence, knowledge of resources available and problems with a technology device or resource. Through the group coaching process exceptions and strengths in applications were amplified and the teachers created an action plan. The round of words suggested that the coaching process was helpful. Through the SWOT analysis some of the essential conditions reported to 'leverage technology' by the International Society for Technology in Education (2021) and Divaharan and Cher Ping (2010) were identified. These conditions included: a collaborative school culture and empowered leaders. However, the teachers also identified that they needed to increase sharing between colleagues and source more resources to facilitate reliability, availability and therefore use. The group coaching process arguably facilitated additional 'essential' conditions, including a shared vision, implementation planning, a plan to reduce contradictions in the activity system including availability of resources and ongoing professional learning support from colleagues (Divaharan & Cher Ping, 2010; ISTE, 2021). At the end of the group coaching the teachers were in a positive position to pursue their organisational goals because they had a shared vision and a realistic plan of action created through a democratic decision-making process (Lewin, 1951; Ryan & Deci, 2000; Burnes, 2004; Rollnick, Kaplan & Rutschman, 2016).

### 7.3 Cycle two

#### 7.3.1 Planning meeting, what changed following group coaching?

On the 3.12.21 Lydia explained that they intended to order iPads but following further discussion, staff expressed a preference for Android devices as they are a lower cost, and this would allow the school to order more devices. A new online homework system called 'Doodle' was trialled following the login difficulties identified with Teams. The new homework system was trialled for one week with one class, following this success, all teachers received training and it was introduced to all classes in January 2022. Following modelling of the school communication App at a parents evening and drop-in sessions, most parents respond to consent forms for a school trip via the school communication application. The changes in applications since the group coaching arguably reflects the solution-oriented principle that change can happen quickly and create more change (de Shazer & Berg, 1997; O'Connell & Palmer, 2018). Lydia reported that the teachers '*valued*' the group coaching session and expressed an interest in an individual coaching session to explore individual applications around technology in more detail.

#### 7.4 Individual solution focused coaching

In the context of time constraints and an increase in COVID-19 restrictions, coaching via MS Teams was agreed. The coaching sessions took place between 5.01.22-7.01.2022 and lasted 30 minutes approximately. Table 2.1 on page 116 summarises teacher experience and technology applications. The teachers are not presented in year group order to protect anonymity. Jane, Sarah, and Katie were offered an individual coaching session but were unable to attend because of commitments to meetings in school.

Table 2.1 summary of teacher experience and technology use

Teacher	Number of Years Teaching	Technology used prior to project
Jane KS1	8	Purple Mash, Teams, Ping, IWB
Hannah KS1	4	IWB, visualiser, iPads, laptop, kindles
Laura KS1	7	Laptop, iPad, cameras, IWB, visualiser
Mark KS2	6	IWB, visualiser, Purple Mash, TTRS, MyMaths, mathsbot.com
Simon KS2	6	IWB, Smartboard, laptops, iPads, visualiser
Joanne KS2	13	Smart board, laptop, iPads, visualiser
Sarah KS2	12	IWB, visualiser
Katie KS2	9	IWB, Purple Mash

#### 7.4.1 Hannah

*Hannah is a key stage 1 teacher with four years experience teaching. At the start of the project Hannah described her goal as using ‘more relevant technology in my everyday teaching’.*

Figure 1.9 on page 120 was created during the coaching session and captures the scaling question, changes in Hannah’s knowledge, confidence and skills between the group and individual session and next steps. Hannah explained that in September they changed from teaching a KS2 class for three years to a KS1 class and this is reflected in the following comment, ‘*how do I fit it all in how do I do all this learning and they go and do continuous provision...it’s been tough*’. A change in year group and provision had the potential to undermine Hannah’s self-efficacy and self-determination (Bandura, 1977, Ryan & Deci, 2000). During the individual coaching session Hannah explained that ‘*I do feel more confident...before we’ve used things but then I just like from that meeting I thought actually yeah I could do that...I don’t feel like I’m as scared of technology as I used to be.*’ Hannah reported behavioural changes in their applications of technology since the group coaching session and this included, ‘*...I’ve started to use the hit the button a little bit more than I would’ve normally and I’ve tried to*

*kind of implement the iPads into learning more...so rather than them go into provision and it not really having any guidance because both myself and her were working with a group I just put on the Ruth Miskin videos...it's just that reiteration of the lesson'. Hannah added that 'I think prior to this the only time they were getting the iPads out was for the computing lesson...'*

Hannah noticed that an online game enhanced motivation in maths and they were surprised by some pupil's engagement. Hannah explained that *'they do love it when it's the computing lesson...they're always dead excited...they loved it actually... it became a bit competitive for some of them for some children that I didn't actually think they would...they got really excited by it...they were like all queuing up they wanted to do that station.'* Hannah also reported using the 'Read Write Inc' online resource and that this supported their subject knowledge and differentiation. Hannah explained that they've *'...taught read write inc for quite a few years now but it has changed massively and that website that we've all got access to is really beneficial because the video is of someone teaching... it's a really useful tool especially when you've got so many different groups in the class there's a few children in there that are kind of not at the same level and it's like juggling things all the time so technology can be really beneficial for that.'*

It seemed that the group coaching enhanced Hannah's self-efficacy as their beliefs in their skills to apply education technology in the classroom increased and this led to new action (Bandura, 1977). Prior to the coaching it seemed that Hannah was at the pre-contemplation stage on the cycle of change as they thought about how to apply technology (DiClemente & Prochaska, 1998). Hannah explained that they could *'give it a go'* and that they *'...spoke to other members of staff just to get that reassurance that I was doing it right'*. Following the group coaching it seemed that Hannah's self-determination was enhanced as they made the decision to act, they believed they could do it and they sought support from colleagues (Ryan & Deci, 2000).

Hannah noticed that sharing practice and more access to iPads would help movement towards these goals. During the individual coaching Hannah reflected that technology can *'...go to the back of my mind'* and that it would help if they

changed their organisation, to include technology in planning and teach the pupils how to use it. A summary of Hannah's self-report ratings of knowledge, confidence, and skills in applying education technology is presented in table 2.2 on page 120. During the individual coaching Hannah shared changes in their self-efficacy, determination, and behaviour as she applied education technology more often and in different ways (Bandura, 1977; Ryan & Deci, 2000). Table 2.2 on page 120 highlights that Hannah's perceptions of their knowledge and skills increased following each coaching session. Hannah reported that her confidence increased following the group and individual coaching and moved down to a 6 at the final group. Possible reasons around why Hannah's self-report decreased during the final group are discussed during cycle three section 7.5.2.

In summary, the solution-oriented coaching supported Hannah to increase her skills, knowledge, and confidence in using education technology. She sought reassurance and support from colleagues, and she changed her education technology organisation which together seemed to help her to achieve her goal in using more relevant technology in everyday teaching.

Hannah

**Figure 1.9**

*Hannah KCS scaling and goals*

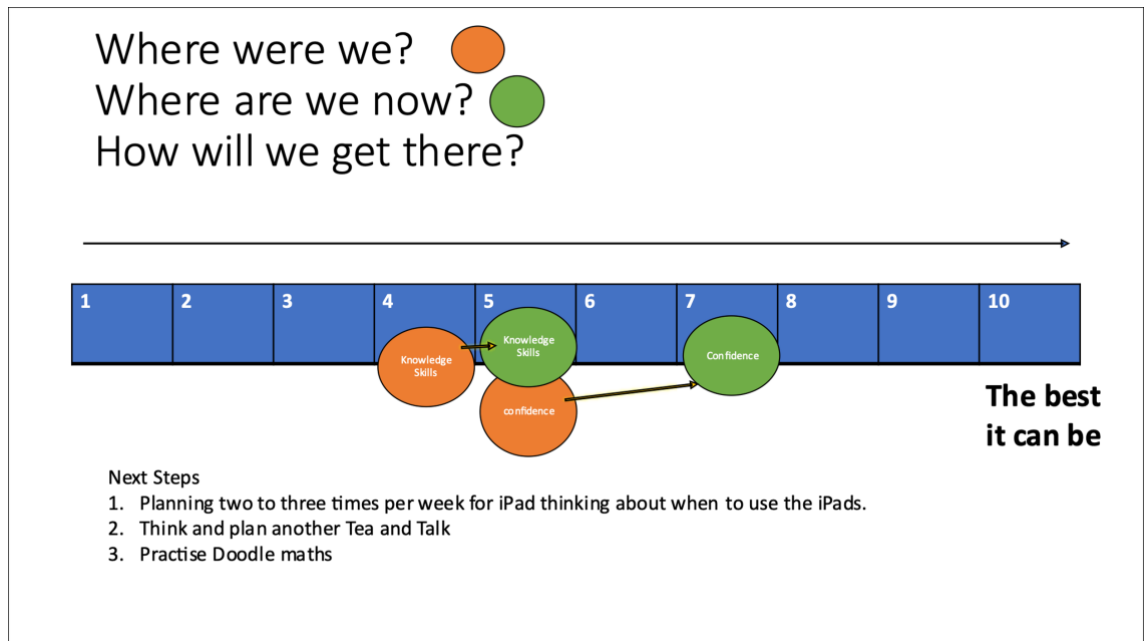


Table 2.2 Hannah self-report KCS summary

	Group coaching 10.11.2021	Individual coaching 5.01.2022	Group coaching 23.2.2022
Knowledge	4	5	6
Confidence	5	7	6
Skills	4	5	5

#### 7.4.2 Laura

*Laura is a key stage one teacher with seven years' experience teaching. At the start of the project Laura wanted to 'use technology to enhance learning and support less and more able'. By February 2022, Laura wanted their 'class to be more confident with technology and have more independence'.*

Figure 2 page 121 was created during the coaching session and captures the scaling question, changes in Laura's knowledge, confidence and skills between the group and individual session and next steps. Laura reported that when she uses technology pupils' *'...engagement, it's better when they're not just listening to me...I can look more at the children and how they are engaging with it rather than when I'm teaching you don't always notice that do you...'* Laura shared that to apply education technology it helped them to practice, find time, and talk about technology applications with colleagues. Laura reported that it was important to be *'... open to it and having a go and planning...if it's not in your planning realistically you're not going to try it and if it's not there you've not got time in the day to think about it...'*

During the individual coaching session, Laura discussed wanting to use the iPads more often, *'...in English one table could be researching that tale and tell us about it and then share that with the class that's just a bit more engaging than just looking at books...'* Laura added that she wanted to use technology to support writing for a particular group of learners *'...so that they would be able to achieve a bit more wouldn't they in the lesson...I could do a small group at a time...it definitely would improve their confidence'*. At the final group Laura reported changes in their skills, knowledge, and confidence presented in Table 2.3 on page 121. She shared that she was *'using it more'* and *'in all lessons not just ICT'*. Laura also shared that they introduce a new application whereby pupils *'audio recorded the children reading their own work aloud and they really enjoyed this'*.

In summary, Laura demonstrated some progress towards her goal in using technology to enhance learning. It is not clear if Laura used the technology to support the *'less able'*. Laura's self-reported knowledge, confidence and skills



increased following each coaching session. The changes in Laura’s application seemed to be enhanced by the way she thought about applying education technology in an ‘open’ way, she was motivated to ‘have a go’ and ensured it was in her planning to facilitate implementation. The coaching helped Laura to identify solutions which worked for her including making time to practice and talking about technology applications with colleagues.

Laura

**Figure 2**

*Laura KCS scaling and goals*

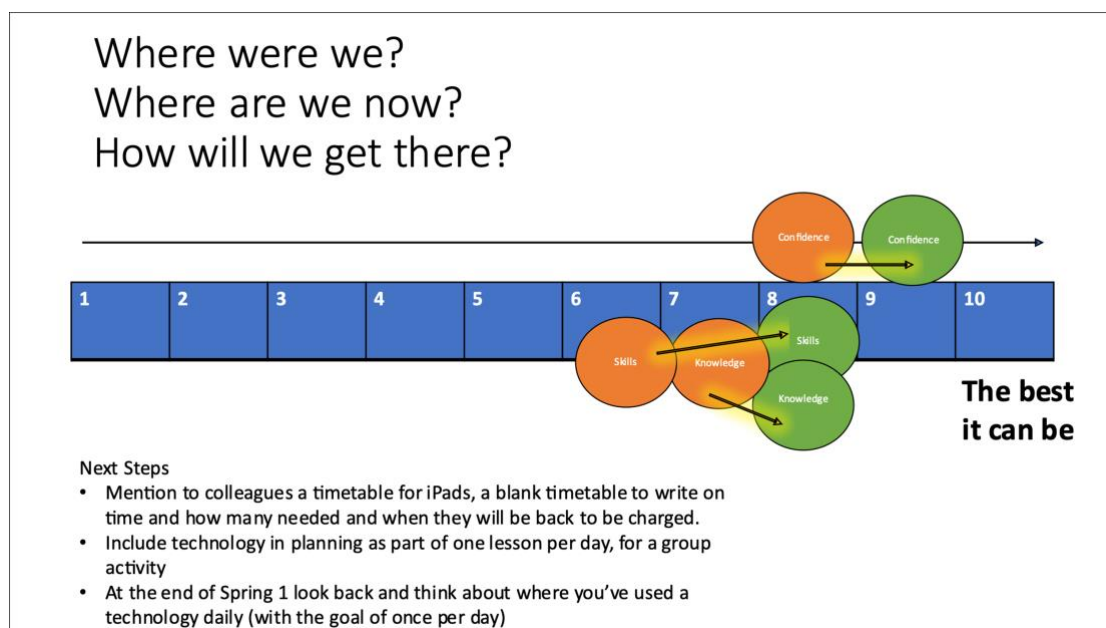


Table 2.3 Laura self-report KCS summary

	Group coaching 10.11.2021	Individual coaching 5.01.2022	Group coaching 23.2.2022
Knowledge	7	8	9
Confidence	8	9	10
Skills	5	8	8

### 7.4.3 Mark

*Mark is a key stage two teacher with six years teaching experience. Mark is the school computing lead. At the beginning of the project Mark wanted to use technology in cross-curricular teaching more often. By February 2022 he wanted to feel 'more confident in myself and supporting children using technology'.*

Figure 2.1 page 124 was created during the coaching session and captures the scaling question, changes in Mark's knowledge, confidence and skills between the group and individual session and next steps. Mark placed their knowledge, confidence, and skills at 6 during the first group coaching session and change is summarised in Table 2.4 on page 124. Mark reported that he can apply technology if he has a go, practice s, explores what's out there and *'...when you can see it's going to be beneficial and it's not a box ticking thing you want to carry on using it, I think I'm going to do a good job with this...'* Mark's motivation to use education technology was enhanced when he had a sense of self-efficacy, autonomy and when he could see what difference it was going to make to teaching and learning (Ryan & Deci, 2000).

Mark shared some behavioural changes in their applications of education technology. Following the group session Mark asked teachers to take videos and write notes on book creator to capture evidence of learning. Mark said that this application was *'...helping me to keep track of what's happening in the subjects across school...'* Mark explained that Doodle was working well and that more pupils were completing homework. Mark also reported changes in their skills, knowledge, and confidence and that they *'tend to think of what I'm not doing rather than what is already in place...if I was thinking a bit more about what I was already using and what was in place I would maybe think oh I'm doing more than I realised'*. The coach asked Mark where he would place his KCS and the coach gave examples of how Mark was already applying education technology. In response to this Mark responded *'go on then you've persuaded me that still leaves a bit of room to er improve'* as he placed himself at an 8. Taking a solution-oriented approach seemed to help amplify Mark's current strengths in applying

technology. Mark possibly developed more balanced thinking around his skills (Grant, 2014). At the end of the final group coaching session, Mark placed their KCS at a 7, this lower rating could reflect Mark's '*tendency to think what he's not doing*'. Alternative explanations are discussed in cycle three section 7.5.3.

During the coaching, Mark explained that he wanted to apply technology to facilitate the '*...same level of support, engagement, and progress across all subjects...*' Mark reflected that the coaching session helped him to create realistic goals, '*...when I came I was thinking about foundation subjects broadly and that's a bit silly really because there's a lot of foundation subjects and that would be too much to take all in one go...*' Further support that coaching helped Mark to create a realistic goal was evidenced at the final group where he shared how he had achieved his goal when he used a virtual tour during a history lesson. Mark added that this application supported pupil motivation, engagement, and learning.

In summary, the solution-oriented coaching seemed to increase Mark's self-reported knowledge, confidence, and skills in using technology. By the end of the project, Mark had achieved his goal in using technology in cross-curricular teaching more often.

## Mark

**Figure 2.1**

*Mark KCS scaling and goals*

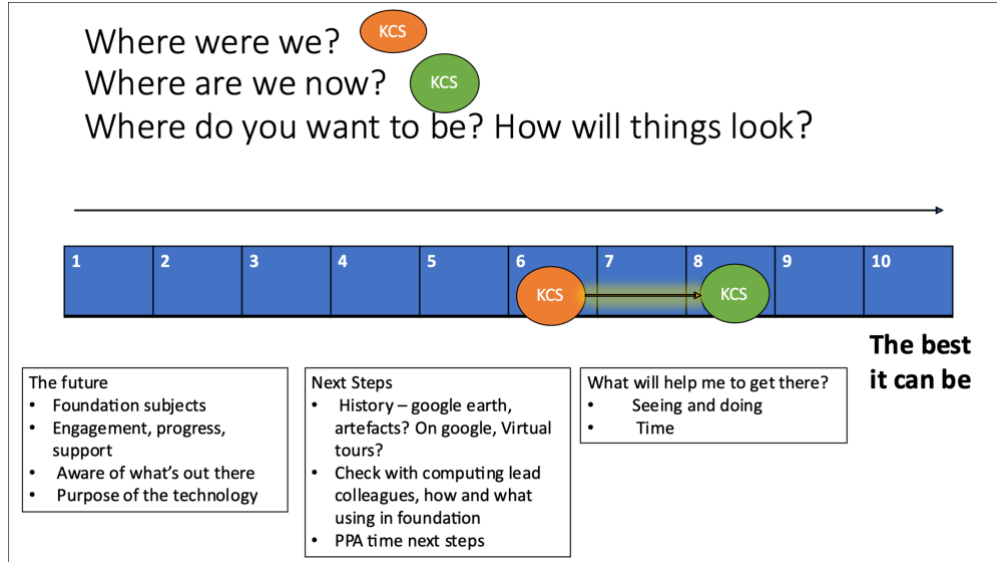


Table 2.4 Mark self-report KCS summary

	Group coaching 10.11.2021	Individual coaching 6.01.2022	Group 2 coaching 23.2.2022
Knowledge	6	8	7
Confidence	6	8	7
Skills	6	8	7

#### 7.4.4 Simon

*Simon is a key stage two teacher with six years experience teaching. At the start of the project Simon wanted to increase the frequency of technology applications and 'get the most out of the school Apps'.*

Figure 2.2 page 127 was created during the coaching session and captures the scaling question, changes in Simon's knowledge, confidence and skills between the group and individual session and next steps. Simon reported that practice and familiarity helps them and their pupils' confidence and fluency in applying technology. Simon explained that he feels confident teaching computing but that they sometimes '*...shy away from...*' using education technology because the iPads might not be available and there aren't enough laptops for every pupil. The technology acceptance model explains that perceived usefulness, ease of use and implementation factors can influence teachers' intentions and uses of technology (Scherer, Siddiq & Tondeur, 2019). The challenges around availability and number of resources appeared to reflect the factors identified by the technology acceptance model and appeared to be undermining Simon's agency (Scherer, Siddiq & Tondeur, 2019). Solution-oriented coaching arguably provided space to acknowledge this pain and the questioning encouraged Simon's to think about what worked well previously, and he suggested '*being more organised with timetabling of things so you're not as reluctant to go and get the technology when you need it*'.

During the individual coaching session Simon discussed a goal around applying technology to support children who are learning English as an additional language. Simon explained that '*...it's a real struggle and I wonder sometimes if I could use technology I suppose in a way to help support them with technology like immersive reader reading it back to them and things like that...there's some other children as well that maybe I can use for interventions in the morning*'. Simon was signposted to an EdTech demonstrator EAL webinar and he said '*that would be good because obviously sometimes you're a little bit lost...*' Simon's challenges reflect that the teachers do not currently have access to an evidence base around applications of education technology (DfE, 2022).

At the first group coaching session, Simon placed their knowledge, confidence, and skills at 7. During the individual coaching session Simon reflected that the coaching session was helpful because, *'it's good to organise it in your head and get a focus for it I think yeah so it's been really good to have a strategy in place for it'*. It seemed that Simon was at the contemplation stage of change and the goal and action planning helped him to reflect on how he could create change (DiClemente & Velasquez, 2002; Zimmer & Matthews, 2020). This possibly strengthened Simon's commitment to change because he shared changes in his applications of education technology at the final group coaching session. Simon reported that he had achieved his goal of using more of the school applications and with increased frequency in lessons, such as Blippit, racing to English and Doodle. Simon reported changes in his knowledge, confidence and skills between group and individual coaching sessions. However, he remained at an 8 during the final group. This possibly reflects that Simon achieved his first goal in using applications with increased frequency and he was possibly experiencing challenge around his second goal whereby he wanted to apply education technology to support EAL learners. It could be argued that a further coaching session could have supported Simon in breaking this goal into smaller steps.

In summary, the solution-oriented coaching helped Simon to achieve his goal to get the most out of the school's technology applications and use these more often. Simon also reported an increase in skills, knowledge, and confidence in using technology and this was sustained at the final group.

Figure 2.2

Simon KCS scaling and goals

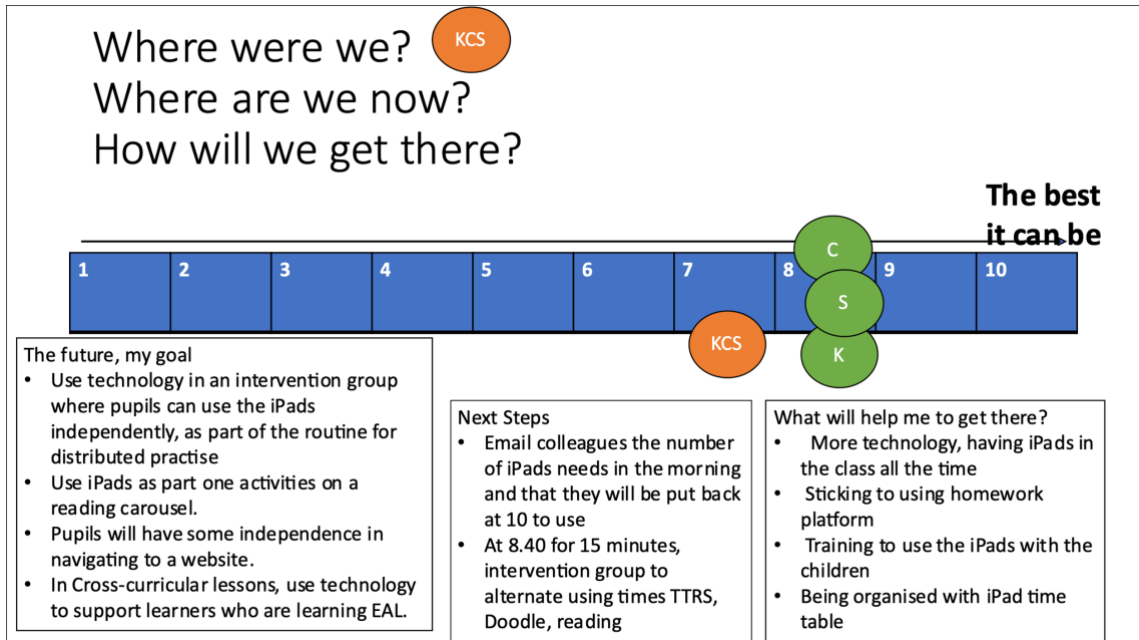


Table 2.5 Simon self-report KCS summary

	Group coaching 10.11.2021	Individual coaching 7.01.2022	Group 2 coaching 23.2.2022
Knowledge	7	8	8
Confidence	7	8	8
Skills	7	8	8

#### 7.4.5 Joanne

*Joanne is a key stage two teacher with thirteen years experience. At the start of the project Joanne wanted to be able to 'teach computing independently and confidently fix tech issues'.*

Figure 2.3 page 130 was created during the coaching session and captures the scaling question, changes in Joanne's knowledge, confidence and skills between the group and individual session and next steps. At the first group, Joanne identified their skills and confidence at 5 and knowledge at 6. Joanne believed they could get to an 8 if they had '*training, practice, time to experiment and play*'. The individual coaching session began on MS Teams and then took place over the phone. Figure 2.3 on page 130 was emailed to Joanne following the session and they were invited to comment on the accuracy and make changes.

During the individual coaching session, Joanne reported that, '*...I'm a little lost in how to help children with technology...I have zero confidence...I feel like I'm wading through mud...I'm always scared of doing something wrong in case I break it.*' Joanne also reported that '*...this year the children aren't particularly confident in using computers... I don't know if it's a combination of their lack of computing because they've been off and my lack of confidence I don't know*'. Joanne's reflections could be interpreted as low feelings of self-efficacy, and from this perspective, these beliefs were potentially negatively influencing her pursuit of her goals (Bandura, 1977). Previous research highlights that those teachers with more experience sometimes feel low confidence towards education technology (DfE, 2021b), Joanne has 13 years' experience as a teacher and was the most experienced teacher in the school. The coach attempted to amplify the exceptions when Joanne had come across the KS2 curriculum and how she now teaches this with confidence.

At the end of the coaching session Joanne reported that she felt more confident because '*...you've made me feel better about myself...your questions that you've asked have made me think a lot more clearly about you know what it is that's stopping me from being confident so yeah I'm feeling more confident now having*



*just spoken to you...* To apply technology Joanne said that it helped to, *'step back that's needed and a little bit of team teaching...just practice one week at a time..'* At the final group Joanne placed their KCS between a 6 and 7 and the changes are summarised in Table 2.6 page 128. Joanne reported that things had progressed in the context of a solution that worked well for her which included *'teaching with a colleague'* and the coaching helped her to target her gaps in her learning and take *'several small steps'* to reach her goals.

In summary, the solution-oriented coaching increased Joanne's confidence and she identified the solutions that could help her achieve her goal. Joanne reported that the solution of team teaching was helping her to achieve her goal. The coaching seemed to increase Joanne's awareness of strengths and skills and help Joanne to create a realistic view of what progress towards her goals could look like (little bits of practice and progress over time).

**Figure 2.3**

*Joanne KCS scaling and goals*

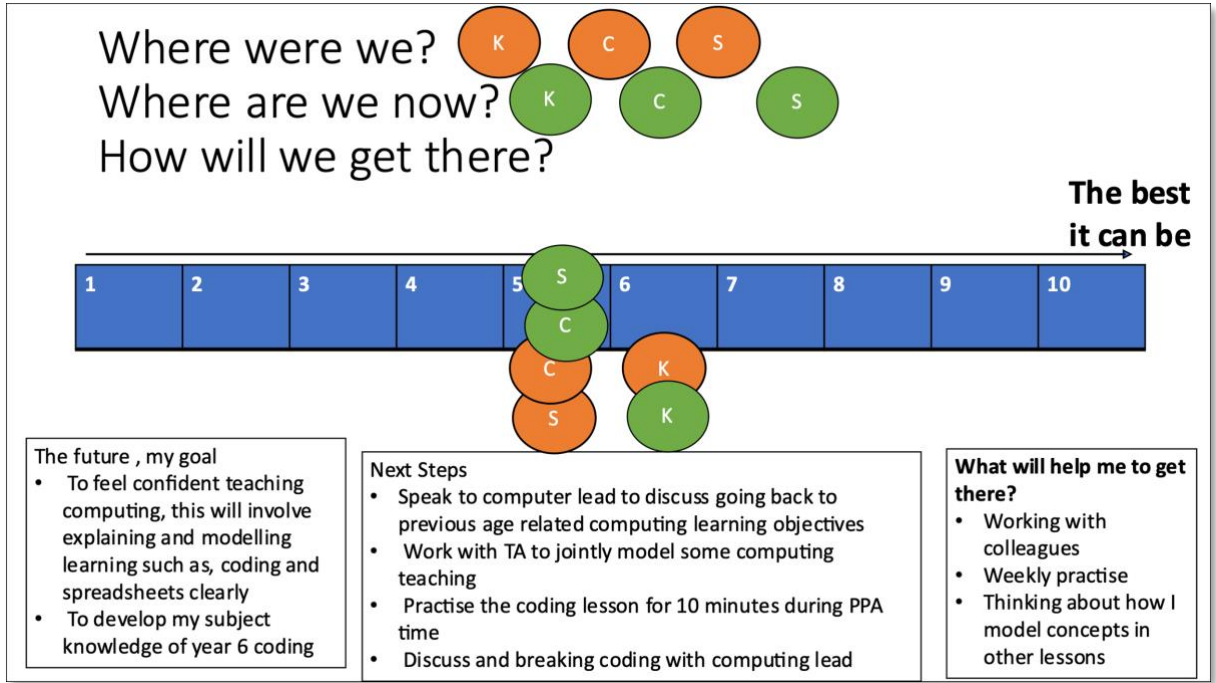


Table 2.6 Joanne self-report KCS summary

	Group coaching 10.11.2021	Individual coaching 7.01.2022	Group 2 coaching 23.2.2022
Knowledge	6	6	6/7
Confidence	5	5	6/7
Skills	5	5	6/7

7.4.6 Teachers who participated in group coaching only

Unfortunately, due to commitments to meetings in school, Jane, Katie and Sarah were unable to attend an individual coaching session and therefore only attending

the first and second group coaching session. Information regarding Jane, Katie and Sarah's self-reported goals and change in their knowledge, skills and confidence is presented here.

#### 7.4.7 Jane

*Jane is a key stage one teacher with eight years teaching experience. At the start of the project, Jane wanted to 'use the IWB without it crashing (it's old) and by February 2022 to use QR codes to help pupils'.*

A summary of Jane's self-report knowledge, confidence, and skills during the project is presented in Table 2.7 on page 132. Jane rated their knowledge as an 8 and confidence and skills at a 9 during the first group coaching session. Jane said a 'QR generator' would help them to move towards this goal. Jane rated their knowledge as a 9 and confidence and skills at a 10 during the final group coaching session. Jane reported that they were '*using the camera visualiser more to model inputs so all children can see more easily*' and that they '*still have the same IWB*' problems. During the group coaching, some teachers shared how they used visualisers to model learning, and it seems that Jane took some of these ideas into her practice. Unfortunately, Jane continued to experience difficulties with the IWB. Previous studies highlight how challenges around resources can create barriers to application (Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding and Guo, 2020). Despite this, Jane reported change in their behaviour and increases in their perceptions of their knowledge, confidence, and skills. This could suggest that the group coaching and school context were sufficient to empower Jane to pursue her preferred goals. It could be argued that an individual coaching session could have helped Jane to liaise with senior leadership around the possible replacement of the IWB and to create a plan towards applying QR codes (a goal Jane identified in November but did not achieve).

Table 2.7 Jane summary of knowledge, confidence, and skills change

	Group coaching 10.11.2021	Individual coaching	Group 2 coaching 23.2.2022
Knowledge	8	n/a	9
Confidence	9	n/a	10
Skills	9	n/a	10

#### 7.4.8 Katie

Katie is a key stage two teacher with nine years teaching experience. At the start of the project Katie wanted to be able to use the IWB *'fuller potential'* and by February 2022 they wanted to *'use tech to support other curriculum areas'*.

Katie's self-ratings of knowledge, confidence and skills change are summarised in Table 2.8 on page 133. At the first group coaching, Katie placed her confidence at a 4, knowledge at 5 and skills at 6. Katie reported that practice would help them achieve this goal. At the final group, Katie placed their KCS at a 6 and that they were now using *'book creator confidently and this is supporting evidence and assessment'*. Similarly to Jane, attending the group coaching in the context of the school culture and other changes taking place, Katie created change in her knowledge, confidence, skills and applications of education technology. By the end of the summer term Katie wanted to use technology to support different curriculum areas and to support EAL pupils. Although limited data was captured, it seemed that Katie did not achieve the goals she described at the start of the project. Similarly, to Jane, it could be argued that an individual coaching session could support Katie to create a realistic goal and plan to using the IWB. Katie's goals to use technology in different curriculum areas and supporting EAL pupils are perhaps unrealistic goals to achieve in the context of other teaching demands.

Table 2.8 Katie self-report KCS summary

	Group coaching 10.11.2021	Individual coaching	Group 2 coaching 23.2.2022
Knowledge	5	n/a	6
Confidence	4	n/a	6
Skills	6	n/a	6

#### 7.4.9 Sarah

*Sarah is a key stage two teacher with twelve years experience teaching. At the start of the project Sarah wanted to be able to ‘use technology more confidently’ and by February 2022 she wanted to ‘use a wider range of technology in the classroom more regularly’.*

Sarah’s self-ratings of knowledge, confidence and skills change are summarised in table 2.9 on page 134. Sarah noted that ‘*support*’ and ‘*practice*’ would help them to achieve their goals. Sarah shared during the group coaching that she felt ‘*stupid*’ when trying to use a visualiser. Sarah has 12 years’ experience teaching, similarly to Joanne, this reflects findings that suggest teachers with more experience feel low confidence towards education technology (DfE, 2021b). At the final group Sarah placed their KCS at a 7 and noted that they ‘*feel more confident in using different technologies, e.g. Doodle, Ping*’. Similarly, to Jane and Katie, Sarah increased their knowledge, confidence and skills and applications of education technology in the context of group coach coaching, school culture and other changes taking place. By summer 2022, Sarah wanted to be able to ‘*use technology to better support the EAL learners in my class*’.

In summary, the solution-oriented coaching, Sarah achieved her first goal to feel more confident to use technology because she moved from a 5 to a 7 and she

reported feeling more confident. Sarah also started to use more technology, such as, Doodle and Ping.

Table 2.9 Sarah self-report KCS summary

	Group coaching 10.11.2021	Individual coaching	Group coaching 23.2.2022
Knowledge	5	n/a	7
Confidence	5	n/a	7
Skills	5	n/a	7

#### 7.4.10 Reflections on teachers who participated in group coaching only

It is interesting to note that, there was quantitative change in Jane, Katie and Sarah's perceptions of their knowledge, confidence, and skills towards education technology. Secondly, it is interesting to note that while the teachers reported change in their behaviour in using education technology more often, they did not report change or achievement of the goals they identified during the first group coaching process. It is noted that the teachers who attended individual coaching process identified specific and realistic actions and steps and also reported at the final group coaching session that they had achieved or were working on the goals they set out. A possible tentative hypothesis offered here is that the individual coaching sessions perhaps helped the teachers to adjust their goals. It could be hypothesised that while Jane, Katie and Sarah reported positive changes in perceptions of their knowledge, confidence, and skills in the context of group coaching, behavioural change towards individual goals could have been enhanced through individual coaching where the teachers could have been supported to construct realistic goals and actions by raising their awareness of their time, skills, and opportunities.

#### 7.4.11 Reflections on the change process during individual coaching

The teachers reported that technology supported pupil learning, engagement, and motivation. Some teachers also believed education technology could remove barriers to learning in writing and learning English as an additional language. In line with previous research, there was variation in teacher's education technology confidence, applications, and goals (Bailey & Snowden, 2021) and confidence towards education technology was lower for more experienced teachers (DfE, 2021b). Applications of technology were facilitated by planning, when teachers believed they could '*have a go*' and sought reassurance and talked to colleagues. Applications seemed to be constrained by perceptions of use, and this was underpinned by experiences whereby resources broke, there was an insufficient number of devices and difficulties accessing the devices (Scherer, Siddiq & Tondeur, 2019). Following the first group coaching session, all teachers reported positive changes in their knowledge, confidence, and skills if they attended the group or both the individual and group coaching. Some teachers also reported that their knowledge, confidence, and skills continued to increase following individual coaching.

Solution-oriented conversational tools including the miracle question, scaling, highlighting resources and reframing facilitated clarity around teacher's thinking about education technology and created realistic goals and achievable next steps (Cavanagh & Grant, 2010). The flexibility of the approach was helpful in capturing and responding to the varied goals, solutions, and actions each teacher planned. The application of solution-oriented questions, particularly 'how' questions proved helpful in connecting teachers with their personal resources and identified the solutions that could work best for them (Cavanagh & Grant, 2010; Harkin, Dean & Monsen, 2017; O'Connell & Palmer, 2018). Teachers told their stories and the pain of 'juggling' many demands were acknowledged (Harker, Dean & Monsen, 2017). The teachers reflected that it was helpful to look at what was already working and to identify smaller steps towards their preferred goals and that the individual coaching gave teachers time reflect.

Previous research reports a converging view that a collaborative alliance can influence coaching outcomes because it creates transparent communication and sharing of feelings which then helps the coach to respond effectively to the teacher's needs (Murphy & Duncan, 2007; Adams, 2016, p.16; Adams, 2016b; Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding & Guo, 2020; Hilaire & Gallagher, 2020; Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021). The collaborative alliance questionnaire was emailed to all teachers following the individual coaching session and four out of five teachers responded. The individual responses are summarised in table 3 on page 135. The teachers reported positive evaluations of the rapport and collaboration during the coaching process which likely supported the coaching process and their planning towards applications of education technology.

The teachers appeared to trust the coach as they shared some of their feelings such as, Hannah shared that changing year group was tough, Mark shared how he tended to think about what he was doing, Simon explained that he sometimes shied away from and felt lost with technology and Joanne felt like they were '*wading through mud*'. Joanne also shared that "...*you've made me feel better...*" According to Frederickson (2001) positive emotions broaden and build a person's agency and resilience. A possible explanation is that the positive emotions experienced by Joanne during the coaching process supported them to identify and pursue their goals. On one hand, this could suggest that because the solution-oriented approach acknowledges the pain this facilitates the collaborative alliance and in turn the coaching process. However, on the other hand, teachers who did not share feelings and did not attend an individual coaching session also demonstrated change in their knowledge, confidence and skills using technology.

It seemed that checking in with the teachers at the end of each coaching session helped teachers to reflect on the process and what was helpful (Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021). This also possibly facilitated the collaborative alliance because the teachers' views on the coaching process were invited throughout the project. Beyond the coaching session, teachers shared that it helped to seek reassurance from colleagues. This is an important change



as research shows that education technology implementation is enhanced by sharing cultures (Divaharan & Cher Ping, 2010). Joanne shared that co-teaching facilitated her confidence and application.

Table 3 Summary of collaborative alliance questionnaire responses

	<b>We had a good rapport.</b>	<b>We discussed goals I wanted to work towards.</b>	<b>I got the sense we were 'on the same page'</b>	<b>The things we did were helpful.</b>
<b>Teacher response</b>	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
<b>Teacher response</b>	Strongly Agree	Strongly Agree <i>and discussed steps about how to get there</i>	Strongly Agree	Strongly Agree
<b>Teacher response</b>	Strongly Agree	Strongly Agree	Strongly Agree	Strongly Agree
<b>Teacher response</b>	Agree	Agree	Strongly Agree	Strongly Agree

#### 7.4.12 Cycle two summary and conclusions

Teachers reported increases in their confidence, knowledge, skills in applying education technology. Some teachers also reported positive changes in their knowledge, confidence, and skills in using technology if they attended the group coaching only. The technology acceptance model offered some possible interpretations around why some teachers 'shy away from' technology applications (Scherer, Siddiq & Tondeur, 2019). The flexible nature of the solution-oriented approach and the conversational tools were helpful in responding to individual teachers' needs. Sensitisation and amplification seemed to help teachers to view education technology positively because they saw what they were already able to do and could do more of (Cavanagh & Grant, 2010).

The teachers reported that the coaching helped to clarify their thinking and create a realistic plan (Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021; Zimmer & Matthews, 2022). Together, a change in thinking about solutions, and planning realistic steps appeared to help teachers' behaviour towards goals (Cavanagh & Grant, 2010; Hutchinson & Woodward, 2018). Theoretical applications of psychology including self-efficacy (Bandura, 1977), self-determination (Ryan & Deci, 2000), cycle of change (DiClemente & Velasquez, 2002), collaborative alliance (Adams, 2013, p.16; Adams, 2016b; Murphy & Duncan, 2007) and broaden-and-build theory (Frederickson, 2001) provided some possible interpretations around the change process. The collaborative alliance seemed to facilitate teachers trust and sharing. The solution-oriented process facilitated seemed to enhance self-efficacy and autonomy to explore technology applications.

## 7.5 Cycle three

### 7.5.1 Planning meeting: what's working, what's changed, where next?

The senior leaders reported that it was helpful for teachers to look at their own practice and they reported that teacher confidence towards technology had increased. The difficulties teachers reported in using some technology resources were shared by the coach, including problems around resources being available or unreliable. Rheanna reported that they were waiting for the ordered resources to arrive (with six tablet devices ordered for each classroom). It was agreed it would be helpful to carry out a final group coaching session to review previous actions agreed on 10.11.2021. The teachers also expressed a preference to discuss a next step towards applications of education technology to support EAL learners and resources were shared at the end of the coaching session.

### 7.5.2 Group solution-oriented coaching SWOT analysis

The group coaching session took place on 23.2.2022 and was attended by the eight class teachers who attending the first group. The senior leaders were not able to attend the second group coaching session due to an OFSTED meeting. A summary of the discussion and SWOT summary is presented in appendix Q. The summaries were shared with the senior leaders during the project debrief. During the group coaching, it was agreed that the school had moved one point up on the scale to 8.

#### 7.5.2.1 Strengths: What was positive/helpful about the education technology in school? How did it influence learning?

Teachers gave examples of applications which were enhancing learning and how changes in applications were working well. The teachers explained that it helped that most iPads now had all the applications they needed. All teachers were using the book creator App to evidence and share learning in music and felt confident doing this. 'Blipit' was also helping teachers to share information with subject leaders to moderate. Following modelling at parents/carers evening, the school-home communication App 'Ping' was working well, and more pupils were completing home learning online. Teachers also reported that the new platform

*'Doodle'* had increased home learning, and this also replaced *'MyMaths'* and was working well. Hannah shared that the *'Read write inc'* videos were supporting differentiation in phonics. Joanne shared how using a *'team teaching'* approach helped them to practice using technology, *'it will be a while till I'm fully confident but he's not afraid to touch anything so it's making me think oh yeah'*.

7.5.2.2 Weaknesses: What was challenging about using technology? How was it not helpful?

However, some teachers reported still feeling *'put off'* using technology because some of the technology resources in school still *'crashed'* while using or received an error message. Simon shared that they worry about the resource reliability as they *'did a lesson yesterday and it was a disaster because they couldn't access Purple Mash and I didn't have a technician to help me sort it out either'*. Mark agreed and explained that *'sometimes it crashes before the work is saved'*.

7.5.2.3 Threats: What were the barriers to using technology?

Teachers reported that they needed more time to practice using the resources and that they needed more resources to use technology more often. Sarah shared some frustration that *'they've been ordered for quite a while...of course they will all need everything putting on so that's another delay'*. Reflecting on their progress towards previous actions, Hannah shared that *'we've made progress but not some of the steps we wanted to'*.

7.5.2.4 Opportunities: Where were the opportunities to use more or different technology? What were the facilitators?

During the session Jane suggested the teachers could model using *'Ping'* with parents/carers who missed the parents evening due to COVID-19 self-isolation. Most teachers reflected that they were ready to *'have a go'* at applying technology in different ways and intended to continue with the plans they created when the new devices arrived. Mark suggested that the challenges around devices crashing *'won't be as much an issue'* with the new devices. It was agreed that the

new devices would help the teachers to carry out the first three actions from the first coaching group.

### 7.5.3 Reflections on the second group coaching change process

Teachers shared that organisational pressures, including not having enough time to come together and practice, negatively influenced their applications of technology. The senior leaders were unable to attend the final group coaching because of a commitment to a meeting with OFSTED. The teachers shared that they were ready with their plans to change applications but felt frustrated that they did not have the devices they requested. A possible interpretation is that the delay in the resources had the potential to undermine their self-efficacy (Bandura, 1977), self-determination (Ryan & Deci, 2000) and change in applications (DiClemente & Velasquez, 2002). The delay in the resources arriving in school presented a barrier to further applications. It seemed that this contributed to a decrease in the collective energy and efficacy of the group as the teachers shared their frustrations.

At the final group coaching session teachers provided written responses to the question *'what worked well about the solution focused coaching?'* These are summarised in figure 2.4 page 143. The teachers reported that coming together to discuss what was already working well and sharing ideas was helpful. The teachers also found it helpful to reflect on their personal development. In line with previous research, some teachers found goal setting and signposting to EAL education technology resources helpful (Zimmer & Matthews, 2020). With regards to the question *'The solution focused coaching could be even better if?'* Hannah was the only teacher to respond to this question and they reported that it would have been even better *"maybe to explore technology together"* in the classroom. The coach discussed with the teachers the opportunity to complete observations and joint lesson planning at the start of the project. The coach believed that the school was making gradual and successful changes and it appeared unnecessary to provide additional direct coaching in school. The coach believed that if they presented the teachers with more applications of technology this could overwhelm the teachers because they expressed challenges in making time to practice their goals. The school was also waiting for new resources which

could have made modelling in school difficult. The coach also noticed that colleagues in school were modelling to other teachers, and this appeared to be working well. However, these reflections suggest that some teachers would like a combination of solution-oriented and instructional coaching approaches.



Figure 2.4 Teacher responses to ‘what worked well about the coaching?’

## 7.6 Quantitative analyses of overall project change

The decision was taken to complete analyses of change in self-reported knowledge, confidence, and skills taken at three time points during the coaching process. Teachers' reflections on their knowledge, confidence and skills using technology were invited using a goal setting form where teachers were asked to scale their views from 1-10 with 1 describing 'a little', 5 'somewhat' and 10 'a lot' with regards to each construct (see Appendix I). Time point 1 took place before the first group coaching process, time point 2 followed the individual coaching session and time point 3 followed the final group coaching. The decision was taken to complete separate quantitative analyses with regards to Jane, Katie, and Sarah as they did not attend an individual coaching session. The average change is outlined in Table 3.1 below. Hannah, Laura, Mark, Simon, and Joanne who participated in two group coaching sessions and an individual coaching session are described as 'teacher group 1'. Jane, Katie, and Sarah who participated in two group coaching sessions are described as 'teacher group 2' (the descriptive statistics calculations are presented in Appendix R).

Table 3.1 Mean self-reported knowledge, confidence, and skills change

	Teacher group 1			Teacher group 2	
Mean	Time point 1	Time point 2	Time point 3	Time point 1	Time point 3
Knowledge	6.2	7.4	7.5	6	7.3
Confidence	6.2	7.4	7.5	6	7.6
Skills	6.2	7.4	7.5	6	7.3

Interpretations regarding the average change in self-reported knowledge, confidence, and skills:

- On average, both groups reported increases in self-reported knowledge, confidence, and skills in the context of the coaching project.
- On average, group one's self-reported knowledge increased more than group two.



- On average, group two's self-reported confidence increased more than group one.
- On average, group one's self-reported skills increased more than group two.

It is interesting to note that the group coaching alone appeared to be sufficient in increasing teachers' perceptions of knowledge, confidence, and skills with regards to applying education technology. Of course, it is recognised that this change took place in the context of dynamic, interacting systems and that positive change outside of the coaching context could have contributed to this. A possible interpretation of group one's greater change in knowledge and skills could be explained by their experience of individual coaching where the teachers identified and explored a specific application of education technology and how they were going to develop this skill and make this change in the classroom. It is interesting to note that group two reported a greater increase in their confidence. It could be the case that group one did not report as high confidence ratings as they evaluated the extent to which they achieved the specific goals they identified. The qualitative analyses highlighted that group two in comparison did not construct or achieve behavioural change with regards to skills in using a specific education technology and this seemed to be a particular benefit of the individual coaching session. Teachers in group two in comparison therefore did not have a specific behavioural target to evaluate their performance against. The quantitative change and differences reflect the qualitative interpretations outlined earlier.

#### 7.6.1 Project end and feedback meeting

During the project feedback meeting, the head teacher said that the project *"helped in supporting teacher confidence about using technology."* The deputy head teacher said the project helped teachers to *"reflect on practice , thinking of own goals, and making sure it was realistic."* The senior leaders said that the project could be even better if teachers could work with the coach in school around a particular technology. The coach asked how the school were going to take the project forward and the senior leaders explained that they were going to

incorporate the actions into an implementation school policy. The coach spoke with the link LA EP to make them aware of the project end and how they could support the school in the future. The coach also signposted the school again to the EdTech demonstrator website to seek further support and links to resources.

#### 7.6.2 Cycle three summary and conclusions

Cycle three involved a group coaching session in school with all staff except the senior leaders. The SWOT analysis highlighted progress in applications of education technology. During the coaching session, the teachers shared some frustration that they were still waiting for new technology resources, and that this was holding teachers back in their plans. Feedback around the coaching process was invited and teachers reflected that the process was helpful in facilitating sharing, the EAL resources were helpful and coaching in school could have improved the project. The senior leaders explained that they intended to take the actions forward into a school policy. In the following section reflections will be offered around the change process in relation the research questions, aims and literature.

## 7.7 Reflections on the research questions, contribution, and aim

The project aimed to enhance teaching and learning with the application of education technology. There were three purposes of the research: to explore the process of using a solution-oriented coaching framework to facilitate change in education technology, to describe the outcomes of the coaching process, and to make theoretical links to psychology to offer possible interpretations around how the framework facilitated change. Here reflections on the research questions and findings are summarised and links are made between theory and practice .

It is first important to emphasise caution with regards to claims around the project findings. The school held a school improvement aim to improve applications of education technology before the project began and changes could therefore be taking place before the project began. It is not claimed that the solution-oriented coaching framework alone contributed to the changes observed. It is also not claimed that the author has captured all possible changes or interpretations. The changes that took place are not reduced to the changes shared during the coaching session. The changes created are viewed cautiously in the context of the solution-oriented coaching project and the wider school context.

### *7.7.1 Research question one reflection*

#### **How can a solution-oriented coaching framework be applied with a primary school setting to facilitate change with education technology?**

The solution-oriented framework was applied through three cycles of action which included group and individual coaching (Whitmore, 2002; Rees, 2017; O'Connell & Palmer, 2018). The solution-oriented coaching framework included questions around what was working well with education technology application, exception finding, evoking strengths and a preferred future, and creating realistic steps towards these goals. The solution-oriented framework presented opportunities to address individual and organisational influences on technology applications. The SWOT analysis and reflections during the change process revealed some facilitating organisational conditions including a collaborative school culture and

empowered leaders. The school culture likely contributed to the solution-oriented coaching model application. The teachers reported that they valued sharing and participation, and the group worked well together to create solutions (Harris, 2002). On the other hand, there was also some organisational factors which inhibited the solution-oriented coaching process. Some teachers were unable to attend the coaching due to other commitments and teachers reporting wanting to practice applying technology, but they were constrained by time and the availability of resources. The new devices did not arrive during the project and this potentially undermined collective energy and efficacy. Some teachers' final self-ratings of knowledge, confidence and skills decreased during the final group coaching, and this offers one possible explanation as the teachers shared their frustration around waiting for resources.

The individual coaching provided an opportunity to have discussions with teachers around their individual preferred goals and solutions. This was important because the teachers' knowledge, confidence, skills, and preferred goals around education technology varied greatly. The flexibility in the individual coaching meant that the coaching process was valued by teachers across key stages because the coach supported teachers from where they were, and the goals and solutions were created by teacher. This meant that the plan was tailored to their strengths and needs, their pupil's needs, and the classroom context. In summary, at the organisational level, the solution-oriented coaching appeared to enhance collaboration and at the individual level, the coaching seemed to support teachers' reflections and planning towards unique goals.

The coaching took place in the context of a collaborative alliance between the coach and teachers as reflected in the teachers' evaluations. The online nature of the individual coaching made it easy to organise the meeting with teachers. The screen share function also facilitated sharing of the teachers' goals and sharing of the SWOT analysis during planning meeting with the senior leaders. The teachers provided positive evaluations of the collaborative alliance and some teachers shared their feelings openly via Teams. This suggests that the solution-oriented model is helpful in hearing the pain and possibility around teachers' applications (Rees, 2017). This arguably suggests that a mixed methods

approach including in person and online coaching can facilitate collaborative alliance. It also seemed that online coaching provides an appropriate and effective means to facilitate change in teacher's education technology applications.

In summary, the combination of group and individual solution-oriented coaching led to positive outcomes because individual, interpersonal and organisational influences were considered and the personalised solutions were identified at the individual, interpersonal and organisational level (Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding & Guo, 2020; Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021; Hilaire and Gallagher, 2020; Grierson, Gallagher, & Hilaire, 2022; Zimmer & Matthews, 2022). However, the teachers' evaluations suggested that the coaching approach could also helpfully include instructional coaching with a coach in school to model resources.

#### 7.7.2 Research question two reflection

##### **How can a solution-oriented coaching framework help teachers to develop their knowledge, confidence, and skills in applying education technology?**

At the individual level, solution-oriented coaching is reported to facilitate two types of change, change in how a coachee views a situation and change in how they enact behaviours towards their goals (Cavanagh & Grant, 2010, p.57). Solution-oriented coaching facilitated new viewing around teachers' knowledge, confidence, and skills in applying education technology. In the context of the solution-oriented coaching teachers reported positive change in their self-reported knowledge, confidence, and skills in using technology. During the group and individual coaching sessions teachers reflected that they were doing more than what they initially thought with regards to applying education technology (Cavanagh & Grant, 2010). The teachers' awareness of resources available also increased and this helped them to see new ways of applying technology. The Technology Acceptance Model explains factors surrounding teachers' intentions and uses of technology and this includes perceived usefulness ease of use and attitudes, self-efficacy, subjective norms and facilitating conditions, and individual differences (Scherer, Siddiq & Tondeur, 2019). The coaching seemed to provide

an opportunity to explore teacher's perceptions and identify exceptions when things were working, the factors that contributed to this and how this could be built upon.

Solution-oriented coaching also seemed to facilitate planning and achievement of goals around education technology. Teachers reported that the coaching process helped them to clarify their thinking and plan realistic, small steps towards goals (Cavanagh & Grant, 2010). It seemed particularly helpful that teachers were supported to develop solutions that they believed would work for them because of the wider pressures' teachers shared about having enough time. This is reflected in the teachers' evaluations as teachers commented that the actions were realistic. This supports the principle that teachers are best placed to identify their own solutions (Rees, 2001; Harker, Dean & Monsen, 2017).

It is interesting to note that teachers who did not attend the individual coaching still reported change in their knowledge, confidence, and skills in using technology. One possible explanation of this is that the collaboration and planning during the group coaching, the wider action research processes and the schools' collaborative culture enhanced their knowledge, confidence, and skills. On the other hand, while Jane and Katie increased their skills, knowledge, and confidence, they did not achieve the goals they identified at the start of the project. It was noted that the coaching process helped Mark and Joanne to develop more realistic goals, implementation plans and solutions which worked for them. It could be argued that an individual coaching session could have helped Jane and Katie to develop and achieve realistic goals. This possibly provides further evidence around the positive influences of individual solution-oriented coaching and that group coaching alone may not be sufficient to support teachers to create personal and realistic goals and plans. Of course, more research is needed to explore and interpret this finding. Further reflections on possible theoretical explanations of the changes observed will be described in more detail next.

### 7.7.3 Reflections on the links between theory and practice

According to Lewin (1942) behaviour emerges from the totality of forces around a person or group. The project began in the context of a school improvement aim to change applications of education technology. It is probable that this context started the unfreezing process (Lewin, 1951). The teachers reported that it was helpful to talk about what worked well and to come together to share ideas. The solution-oriented group coaching facilitated a shared vision of education technology as teachers shared their views through a democratic group process (Lewin, 1951; Rees, 2017). This is important because shared visions and innovative orientations strongly predict technology implementation (Zhu, 2015). From this theoretical perspective, at the end of the project the school appeared to be working in a change state as it developed new ways of applying education technology. It could be suggested that the teachers experience of democracy, autonomy, and empowerment in using technology and the collaborative culture of sharing will likely support the sustainability of changes created during the project.

The solution-oriented coaching framework arguably facilitated deeper organisational insights and actions to enhance education technology application. While the senior leaders of the school were visible in sharing their expectations around education and this is reported to enhance implementation, a contradiction and tension occurred because the teachers didn't have the resources they needed, or they didn't work well (Divaharan & Cher Ping, 2010). Following this, the school ordered new resources that would be available in each classroom. A possible theoretical explanation is that through the action research process and group coaching the school moved towards becoming a learning organisation as they became more aware of the activity systems which enhanced and inhibited their practices with technology (Divaharan & Cher Ping, 2010). Moving forward it could be argued that this new sharing and the new resources will help the school to continue to embed education technology into teaching and learning through collaborative activity systems. However, further research is needed to evaluate the extent to which and if change continues and becomes embedded.

Psychological theory offers helpful insights and possible explanations around the adoption of technology to lesser and greater degrees. The coaching process facilitated teachers' awareness of their knowledge, skills, and confidence in applying technology and that they have the capacity to create change (DiClemente & Prochaska, 1998). During the coaching process, the coach gave positive feedback around the teachers' strengths and amplified the times when they applied technology (Rollnick, Kaplan & Rutschman, 2016). The coach also encouraged the teachers to develop balanced thinking around when technology was working well (Grant, 2014). The teachers provided positive feedback about the coaching process, and they valued focusing on what was working well because they typically thought about what wasn't working. Frederickson's (2001) broaden-and-build theory offers a possible interpretation that the positive emotions broadened the teachers' interest, creative thoughts, and actions, and built their resilience towards applying technology (Frederickson, 2001, p.218).

However, positive emotions alone are not sufficient, motivation involves energy, persistence, and intention (Ryan & Deci, 2000). The focus of the individual coaching was directed by the teachers' education technology priorities for their pupils and solutions that could work them. Teachers therefore experienced autonomy, competence, and connection with the coach which possibly enhanced intrinsic motivation (Ryan & Deci, 2000). The goals and plans were constructed from the teachers' strengths and solutions. For example, many teachers noticed that they needed to include the education technology in their planning time and a realistic goal could include at least one application every day. With a clear plan tailored to their needs, this possibly reduced their ambivalence towards change and enhanced their commitment and perseverance towards their goals (Bandura, 1977; Rollnick, Kaplan & Rutschman, 2016). In summary, the solution-oriented coaching contributed to positive changes in teachers' confidence, awareness of education technology. Teachers who attended both group and individual coaching achieved their initial goals because they created a realistic plan with personalised solutions and this possibly enhanced commitment and motivation as the teachers' experienced success and progress.



#### 7.7.4 What contribution does the research make to the literature?

The research adds to the evidence base around coaching to facilitate change in teachers' knowledge, skills, confidence, and application of education technology in a primary school context. The research adds to the evidence base that a solution-oriented action research and coaching framework can evoke commitment to change and help groups and individuals to act and identify solutions (Burnes, 2004). The positive outcomes following the group coaching has been noted in previous research. Hutchinson and Woodward (2018) found that group discussions can increase perceptions of efficacy, feelings of 'camaraderie' and sharing with colleagues (Hutchinson & Woodward, 2018). The findings are in line with previous research suggesting that solution-oriented models can be effective in facilitating systemic and individual change (Rees, 2017; Grant & Gerrard, 2020). The analyses revealed that solution-oriented coaching can support discussions around a shared vision, successful ways of doing things and the systems schools have or need to develop to pursue education technology goals (Rees, 2017, p222). The findings align with previous findings that report that coaching can be effective in person (Grant, 2014) or through an online video call, on an individual or group basis (Matsumura, Correnti, Walsh, DiPrima Bickel & Zook-Howell, 2019; Passmore, 2021). The collaborative alliance facilitated communication with teachers (Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding & Guo, 2020; Hilaire and Gallagher, 2020; Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021). The findings from the project also suggest that it was possible to continue to build the collaborative alliance with teachers through online coaching.

The teachers reported similar positive feedback to previous research which highlights that teachers value coaching because it presents a personalised approach to identify goals and plan implementation (Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding & Guo, 2020; Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021; Hilaire & Gallagher, 2020; Grierson, Gallagher, & Hilaire, 2022; Zimmer & Matthews, 2022). In line with previous research, the teachers reported that the coaching provided "*essential*" time to reflect (Zimmer & Matthews, 2022, p.11) and included small steps over time to support planning (Hutchinson & Woodward,

2018). The teachers also shared that the coaching could have been even better if the coaching including working with a coach in school. This reflects reports from teachers in the literature that modelling and co-teaching is helpful (Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding & Guo, 2020; Liao, Ottenbreit-Leftwich, Glazewski & Karlin, 2021). The research adds to Hutchinson and Woodward's (2018) findings that coaches do not need to be a technology expert to support teachers' professional development because teachers know the goals and strategies that will work for them. The teachers valued the EAL resources, and this finding suggests that coaching can be combined with other activities to support teachers' professional development, a finding highlighted in the systematic review (Liao, Ottenbreit-Leftwich, Glazewski, & Karlins, 2021).

The research adds to the evidence base around teachers' application of education technology in a primary school context (Gu, Crook, & Spector, 2019). The individual coaching replicates the finding that there are individual differences applications (Bailey & Snowden, 2021; DfE, 2021b). While the current study draws upon teacher self-reports alone, it adds tentative evidence of the positive influence of education technology to enhance teaching and learning, particularly, distributed practice , modelling, assessment, and differentiation (Bower, 2017; Crompton, Bernacki & Greene, 2020). The teachers reported positive outcomes of applications including enhanced engagement, motivation, and application of skills in learning. The current study also adds to the evidence base around the design features of some technologies which can help children to learn. The teachers reported that the technology applications that enhanced teaching and learning adapted the level of difficulty, provided assessment information, and gave opportunities for repetition, distributed practice , and interleaved learning (Bower, 2017; Crompton, Bernacki & Greene, 2020).

During the coaching sessions the teachers made some thoughtful applications of education technology grounded in the purpose and outcomes of the application. The teachers considered the developmental needs of learners, for example, in key stage 1 teachers used Apps which were easy to use and considered how they would first teach how to use a device (Parish-Morris, Mahajan, Hirsh-Pasek, Michnick, & Fuller Collins, 2013). The teachers' views reflect previous findings

which show that there are individual differences in pupil competences in using technology and this sometimes negatively influenced effective use of technology (Bailey & Snowden, 2021; DfE, 2021b). In the present study this also sometimes negatively influenced teachers' perceptions of using the resource in the future because they were concerned that pupils' competencies using the device took away from the learning.

The research replicates many findings around the conditions that facilitate or inhibit technology application in schools (Gu, Crook, & Spector, 2019). The senior leaders of the school were visible in how they shared expectations around education technology and this along with the development of a shared vision, implementation planning, and plan to source new resources provided some essential conditions known to leverage technology (Divaharan & Cher Ping, 2010; ISTE, 2021). Similarly, to Hilaire and Gallagher (2020) the coach liaised with leadership to try and resolve problems with technology resources. Teachers reported that sharing ideas and co-teaching supported their confidence and applications. This mirrors previous research that highlights that support and encouragement from colleagues is helpful and promotes a collaborative culture (McConnell, Parker, Eberhardt, Koehler & Lundeberg, 2012; Zhu, 2015; Hutchinson & Woodward, 2018; Zimmer & Matthews, 2022). The project provides further insight around how interactions between teachers can facilitate applications (Divaharan & Cher Ping, 2010; Gu, Crook, & Spector, 2019).

The research also captured similar findings regarding barriers to education technology application. The findings showed that teacher confidence towards technology varies and appeared to negatively influence teachers' self-efficacy and behaviour (McConnell, Parker, Eberhardt, Koehler & Lundeberg, 2012). Teachers' confidence was low for teachers with more experience (DfE, 2021b). Time constraints, wider school pressures, resource costs, knowledge of technology available and access put teachers off using technology (Koehler and Mishra, 2013; Milton, 2015; EEF, 2019; Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding & Guo, 2020). Teachers reported wanting to practice applying technology and share ideas with colleagues but making time to do this was a challenge (Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding & Guo, 2020). Cycle three reflects the

findings reported by Divaharan and Cher Ping (2010) that availability of resources can lead to contradictions and tensions in school systems.

#### 7.7.5 Research aim reflection

The project aimed to enhance teaching and learning through applications of education technology. The teachers reported that applications of education technology enhanced pupil motivation, engagement, distributed practice, and reduced barriers to learning around writing and language. Some teachers in the project also shared how they used videos more often and this helped teachers to see if pupils were understanding the information and they reported that pupil engagement increased. Similarly, some teachers used modelling videos to support independent learning during continuous provision time. There were organisational and individual changes which facilitated change in applications to enhance teaching and learning. Individual outcomes included changes in teachers' awareness of technology resources in school, planning and confidence and together this facilitated change in applications of technology. Organisational outcomes included a shared education technology vision, ordering new devices, new sharing around what education technology is available and how this can be used to enhance teaching and learning, and further collaboration between teachers.

These changes together possibly suggest positive implications for teaching and learning because teachers had support from colleagues, they knew what education technology they could use to enhance teaching and learning and how this was available. The teachers reflected that they were more likely to use the new resources because they felt that the new devices would be reliable and available. Unfortunately, at the time of the project, the resources had not arrived, it is therefore unknown if and to what extent the new devices influenced teachers' applications of technology. To summarise, positive changes in teachers' awareness, confidence and applications were noted and teachers described positive influences of this on teaching and learning. However, it cannot be claimed that the coaching alone facilitated the positive changes observed. Further research that includes measurements of learning outcomes in the context

of coaching could helpfully capture specific and measurable influences of coaching on learning outcomes. The limitations and quality of the research process are discussed in more detail next.

## 7.8 Critique of research quality

### 7.8.1 Trustworthiness, and quality in flexible designs

Evaluation of the quality of applied research has led to a debate around what counts as quality evidence and what 'good' evidence should involve. Given their different philosophical assumptions, it is not surprising that authors working with qualitative, flexible designs do not accept the measures and perspectives taken by fixed design research when making judgements about the quality and claims of qualitative research (Newton and Burgess, 2008). For example, it is not the aim of flexible design research to test hypotheses in a controlled situation because qualitative research typically seeks to explore experience and meaning in messy real-world contexts. Robson and McCartan (2011) propose that evaluation of flexible design research involves trustworthiness or credibility, and that concepts of credibility, transferability, dependability, and confirmability can be helpfully explored and communicated throughout the research process.

Evaluations of the quality in qualitative research involves judgements around how the research is conducted, analysed, and documented and the extent to which each step is credible (readers can trust the claims made from the data), transferable through details that facilitate comparison, dependable (outcomes are transparent and detailed), confirmable (findings are interpreted logically) and transformative (the outcomes of the research shape positive change) (Mertens, 2019). In the present study trustworthiness was enhanced through reflexivity, detailed description, careful interpretation, prolonged involvement, triangulation, debriefing and support, member checking and a clear audit trail (Robson and McCartan, 2011). These steps will be described in detail in the following sections.

### 7.8.2 Issues of reflexivity

Through continuous, deep reflection and awareness raising between the researcher, their beliefs, experience, the data collected and its interpretation,

reflexivity is one of the ways in which researchers can enhance trustworthiness in findings (Berger, 2015; Dodgson, 2019). Reflexivity is a cornerstone of qualitative research and acknowledges that the “background of the researcher affects the way in which he or she constructs the world, uses language, poses questions, and chooses the lens for filtering the information gathered from participants and making meaning of it, and thus may shape the findings and conclusions of the study.” (Berger, 2015, p220). Researchers can take steps to mitigate some of the effects of their personal and professional position and avoid “...finding what they set out to find” (Dodgson, 2019, p221). It is recognised that the researcher, their experience, beliefs, and position influenced the design, data collection and interpretation. Some of these biases will be outlined along with the steps taken to increase the researcher’s awareness and quality of data collection and interpretation.

The researcher acknowledges that their previous role as a primary school teacher and their experiences of the challenge and opportunities of using education technology in a primary school could have influenced the questions asked and interpretation of data. The researcher could have noticed applications and experiences which were like their own. The researcher similarly worked in a single form entry primary school where similar technology was being used (interactive whiteboard and iPads). The researcher also worked closely with the teachers, getting to know them over the three coaching sessions and developed a trusting relationship with them. This in turn could have influenced interpretation of comments, with the potential to over emphasise positive change. The researcher’s questions also mostly focused on positive change and therefore detail around when technology wasn’t working or changing wasn’t captured. It could be the case that the teachers said what they thought they wanted the coach to hear and/or what senior leaders wanted to hear as education technology was raised as school improvement priority. The presence of senior leaders during the first group coaching session could also have influenced teacher’s contributions, particularly if the teachers held a contrasting view. This in turn could have negatively influenced the accuracy of the SWOT analysis and description of change. Finally, the teachers were also aware that the researcher was a TEP and they may have been influenced by the power that is sometimes associated with

this position and this could have added to the teachers saying what the coach wanted to hear.

The researcher aimed to maintain reflexivity throughout and enhance transparency through description of methodology, coaching procedures, a research diary, and detailed analysis. The analysis of the individual coaching sessions was coherently organised with teachers' experience described. To self-monitor biases, quotes were used to illustrate interpretations and applications of psychological theory. To maintain a balance between the coach's personal position and interpretation of the data, the researcher took time to repeatedly come back to the data and discuss interpretations during academic supervision. To mitigate against the influences of the researcher's bias during interpretation, triangulation of data sources was used to support conclusions, including SWOT analysis, teacher self-ratings, questionnaires, and observations of the coach. Member checking was employed during each coaching session and feedback meeting to verify the accuracy of coach's understanding and summary. It could also be argued that the time between the coaching sessions and analysis provided the necessary conditions and balance for collaborative alliance and some detachment and space for the researcher to step back from the process and data. However, the analysis is still nonetheless limited because the researcher facilitated both the coaching process and completed the analysis. This means that, the interpretation of the coaching session is also influenced by the researcher's personal experience and skills facilitating the process.

The analysis could have been enhanced if the researcher completed an analysis of a coaching session delivered by another educational psychologist. Adding to this, while the senior leaders acted as partners in the research process and were involved in discussions about how the project would evolve, particularly the frequency and format of coaching, it is acknowledged that the teachers were not partners and did not have influence over the type, format, or frequency of coaching. The researcher could have been influenced by the views of the senior leaders and the interpretation could have been enhanced by also engaging with teachers as co-researchers. The data collection could have been enhanced by engaging with the teachers as co-researchers who may have suggested in school

instructional coaching at an earlier stage. In summary, while conscious steps were taken to increase the researcher's awareness and sensitivity to their personal bias and the plausibility and trustworthiness of findings, the collection, interpretation, and accuracy of the data is nonetheless not independent from the researchers' beliefs and experiences.

### 7.8.3 Quality and criticisms of the action research process

Criticisms of action research include reliance on the researcher, a focus on practicality, and that action research does not have a distinct methodology to analyse data (Cohen, Manion & Morrison, 2007). However, involvement rather than reliance is important so that decisions can be taken with participants around where and what the action should involve. Cook (2009) describes this as the "mess" as individual and shared understandings and practice are explored. Cook (2009) argues that working together in this messy area is vital in leading to a "messy turn" of unlearning, new learning and change and that this should be reported honestly in accounts to aide rigour. When a research question requires a flexible methodology, it is arguably unnecessary to specify a clear set of methods, what is important includes triangulation, clarity and honesty surrounding the research process.

Quality action research can provide conditional, practical, useful knowledge when it is reported systematically. Quality action research should leave the research question and people involved stronger (Reason & Bradbury, 2011) and contribute to theory (Reason, 2006, p.189). Action research involves reflection around what is important, what is working, what is not working and how can this be communicated effectively (Reason, 2006, p.198). The research process should therefore include reflexivity so that the choices, ideas, and assumptions underpinning the research are explicit. Quality in action research can be achieved through clarity in each phase of the research, including a clearly defined change issue, stakeholder identification, a description of the relationship between the people involved (including any power dynamics), decision making around data collection tools is clear and their limitations acknowledged, data analysis is both collaborative and theoretically grounded, explicit reference is made to new



understanding about the change, the extent to which the research is transferable is highlighted, and the findings are reported and disseminated (Willig & Stainton, 2017, p.68). Newton and Burgess (2008) suggest the quality of action research also depends on the “workability” of action research outcomes (Newton & Burgess, 2008, p.26). Newton and Burgess (2008) suggest that researchers should consider process, democratic and catalytic validity because this involves the extent to which the outcomes matched the research purposes, included collaboration with stakeholders and led to change (Newton & Burgess, 2008).

In the present study, democracy during the research process was facilitated during meetings between the coaching sessions to check with senior leaders that the research was meeting the hopes the school identified at the beginning of the research and meeting any emerging needs. Each cycle of action was described in detail and coaching artefacts provided to support transparency. At the end of each group coaching session the teachers’ views were invited through a round of words, comments, questions, and reflections to capture to what extent the process met the purposes and to facilitate collaboration. Collaborative alliance was built with the teachers, and this was evaluated through the collaborative alliance questionnaire. The workability of the process and catalytic validity can be seen in the group coaching summaries, the individual goal setting form responses and in the changes that took place between the first and last group coaching. The data analysis was theoretically grounded in psychological theory around organisational change and motivation. The findings were disseminated to the school throughout the project and during the project debrief. To enhance reflexivity throughout the research process, reflection, academic supervision, and a research diary was completed (see Appendix B). Finally, considering the positive changes that took place during the project, it is argued that the school was left stronger.

#### 7.8.4 Credibility

Enhancing the internal validity of the research process and outcomes involves a valid, accurate and complete description of the research focus, process, and data. Interpretation can threaten the confirmability of the research outcomes

particularly if there is insufficient data to support claims. In the present study these threats were managed by including examples of the coaching transcript and scaling during both the group and individual sessions which included details around how the coaching session took place. During each session the coach reflected the teachers' comments and to what extent the outcomes and actions discussed were helpful, and accurate in reflecting the coaching session. Member checking involves sharing findings and inviting views around the accuracy and interpretation to reduce researcher bias around interpretation. The SWOT analyses were shared with the senior leaders to invite comments, questions, and reflections. The description of the coaching sessions and the SWOT analyses together enables readers to trace interpretation. The findings were also triangulated by combining qualitative descriptions of the coaching sessions and measuring quantitative changes in self-reported knowledge, confidence, and skills before, during and after the coaching sessions.

#### 7.8.5 Confirmability

The research process and outcomes are open to criticism if alternative explanations are not considered and if the findings do not reflect the theoretical perspectives underpinning the research. For this reason, the author took an ecological perspective to offer possible explanations of factors that could be influencing changes that took place during the project. Academic supervision was used to reflect on possible explanations of the changes observed (Newton & Burgess, 2008). Academic supervision raised the author's awareness of their values, perspectives, experiences, and potential influence on the research (Burr, 2015, p.176). The author also attended applied research methods seminars at university where the researcher engaged in discussions about the research including how to approach and interpret the findings to open their perspective.

#### 7.8.6 Dependability

In action research, the project leader and stakeholders typically work closely together over a period, and this can open the research to credibility through involvement over time. However, it could also present threats of bias and rigour. The author has experience of applying solution-oriented principles in educational psychology placement activities, such as, facilitating a solution focused brief

therapy intervention with a young person and applying systemic solution-oriented models (Rees, 2017). The author sought to enhance the dependability and rigour around the coaching process by including two observations by two qualified EPs (see appendix S for the EP's observation notes). This enhances dependability around the rigour and integrity of the coaching process.

#### 7.8.7 Transferability

Transferability is important in flexible designs, and it can be enhanced through clear descriptions that allow readers to understand to what extent the context, process and outcomes could be applied in a different context. To facilitate evaluations of the study's transferability, detail around school demographic information, size, and education technology resources available is presented. Transferability is also enhanced by the detail provided around the research process, the tools used and teachers' experience. The applications of technology in this study reflect those typically seen in primary school settings (DfE, 2021) and this enhances transferability. The study also included teachers with a range of experience. The findings can therefore be thoughtfully applied to mainstream primary schools in England.

#### 7.9 Research limitations and future directions

There are methodological limitations around the coaching model and data collection which influence the strength and scope of the findings. The research recruitment process, data collection and analysis were restricted by doctorate time constraints and to a single coach. This meant that the research needed to include manageable cycles of action and data collection. The research therefore focused on the perspectives and actions of teachers only. The data collection was also limited to the group and individual coaching sessions. It is unclear if the coaching facilitated long-term change with coaching because the action cycle took place over a four-month period. The data collection overlooks the important contribution of pupils and teaching assistants and their insights and solutions around how to implement technology in schools (Rees, 2001). More research is needed to evaluate the resilience of solution-oriented coaching in facilitating

change in teachers' applications with technology (Gu, Crook, & Spector, 2019). Triangulation of data collection over multiple cycles of action that include pupil and teaching assistant views and teacher observations could provide deeper insights around facilitating change around education technology. The observations could provide helpful descriptions of technology application in the classroom. It would also be helpful to know if the approach is successful in creating change with other education settings, such as, secondary schools and if online coaching facilitates comparable change to in person coaching.

There were also limitations in the coaching model applied. The group coaching was facilitated by the coach alone, this means that the data collection and analysis does not include detailed information the influence of group dynamics on the coaching process. The coach also had not applied solution-oriented coaching previously and does not hold qualifications in coaching. Steps were taken to try and enhance the coach's reflexivity and integrity of the coaching framework through the literature review, observations of the sessions and teacher evaluation. However, it is important to be cautious that the changes observed could reflect the coach's competencies and interpretations. Future research could helpfully draw upon frameworks or standards developed by the British Psychological Society coaching division (BPS, 2022). Time constraints also meant that it was not possible to pilot the coaching framework with a school. A teacher and the two senior leaders gave feedback that it could have been even better if the coach worked with teachers in school. Pairing an instructional coaching session that included observation could add further support and depth to the changes taking place. Future research could therefore helpfully evaluate the application of solution-oriented and instructional coaching and the influence of coach competences on outcomes.

## 7.10 Implications

### 7.10.1 For policy makers and local authority children's services

The current study adds to previous research around the effectiveness of coaching to support schools in facilitate change in education technology applications. If

schools are going to be able to develop collaborative sharing cultures and apply education in the context of wider demands, schools need: funding to purchase resources, a means to buy and repair resources quickly, and support and time to develop their practices. Policy makers should consider incorporating coaching in the EdTech strategy as an effective approach to facilitate positive change in organisational and individual applications of education technology.

Teachers also need protected time to develop their skills, knowledge, and confidence in applying technology. The DfE edtech policy should provide an infrastructure that allows staff time away from class or co-teaching time with a coach or experienced colleague in school. In this project the teachers also reported that they valued access to resources around how to support EAL learners. This has particularly important implications with regards to technology providing an opportunity to remove barriers to learning (DfE, 2015). The teachers also reported that they were not aware of the EdTech database. The edtech database needs to be disseminated to schools and expanded so that teachers access technology resources and ideas. However, while the EdTech database includes webinars around education technology such as, Google Classroom, without consideration of teachers' individual needs and strengths and opportunities to share practice, it will arguably be limited in developing practices with education technology. Furthermore, the school in this project did not have Google Classroom resources, and as a result many of the webinars on the EdTech database are not applicable or helpful to the setting. This again suggests that the database needs further evidence and guidance, including for example how to use technology to support pupils learning EAL. Schools need support that is tailored to their resources and needs. Demonstrator schools could employ systemic and individual coaching because it offers a flexible, personalised approach to facilitate change in education technology application.

#### 7.10.2 For education technology school improvement

Educational outcome inequality has been exacerbated by the COVID-19 pandemic as pupils have experienced significant disruption to their learning and much more (DfE, 2021b; DfE, 2022, EEF 2022). While research reports the positive influence of education technology on outcomes (Lewin et al., 2019),

schools face challenge in creating change because of the complex organisational and individual influences on technology implementation. The conditions which were shown to facilitate applications are captured in figure 1.3 on page 67. Figure 2.5 on page 167 adds to the systematic literature review concept map. Senior leaders could draw upon this framework when they are considering how they can develop their practices with education.



Figure 2.3 a framework of successful steps and systems to support schools in creating change with education technology.

### 7.10.3 For educational psychologists facilitating change

The focus of this research is highly relevant for educational psychologists (EPs) because EPs have an opportunity to build the capacity of school systems to enact inclusion and create positive outcomes for children and young people (DfE, 2015). However, EPs face the question “*how best to effect change?*” (Rees, 2017, p.217). The findings suggest that the solution-oriented coaching framework offers an effective means to create change in schools. EPs can draw upon solution-oriented coaching as an early intervention to support schools in developing their systems and teachers’ knowledge, confidence, and skills in using technology, with positive implications for teaching and learning at the universal level (Brown, Powell, & Clark, 2012, p.30). In the current climate, local authorities are responding to a high number of statutory education health and care needs assessments, and this has significant implications around how EPs can use their time. However, the solution-oriented framework applied here offers evidence of the effectiveness of online coaching which reduces both time and location demands.

EPs can promote an evidence-based understanding of education technology school improvement as an organisational and individual process that can be enhanced with collaborative school cultures, the availability of sufficient technology resources, realistic goals, and implementation planning (Boyle & Kelly, 2015). EPs can promote this understanding by working with schools and local authorities’ children’s services strategically, including, school advisors and specialist teachers. Finally, the language EPs employ when working with children and young people, their families, education professionals and settings is critical. The findings here suggest that the solution-oriented coaching framework offers a helpful language that recognises and amplifies the unique strengths and insights of people. It is suggested that solution-oriented language offers an opportunity for EPs to promote inclusion and social justice by shifting discourses from deficit, to discourses of democracy, strength, autonomy, and empowerment (BPS, 2022, p.227).



### 7.11 Dissemination of project findings

The findings were shared with the school throughout the project. The author intends to present the project to the local authority EPS and northwest professional development conference for EPs. The author met with the local authority manager of school advisors and the manager explained that it would be helpful to share the solution-oriented coaching framework and findings with the school advisors because they try to adopt a coaching approach but have not received any formal training in coaching theory or methods. The author intends to do this on completion of the doctorate course.

### 7.12 Reflections on the research process

I am pleased the project was able to facilitate positive organisational change that enhanced practice with educational technology. Similarly, I am pleased that the project was able to facilitate positive changes in teacher's skills, knowledge, and confidence around education technology application. Through the course of the project, I developed my skills, knowledge, confidence, and competence to apply solution-oriented coaching. On reflection, it was helpful that I also adopted the same 'have a go' approach the teachers employed. The project has given me invaluable experience I will take forward as a practising EP because it has shown me that solution-oriented practice can facilitate change and I have the skills needed to support change with individuals and organisations.

If I was to complete the project again, I would replicate the model as I believe this was effective in facilitating change as it considered individual, interpersonal, and organisational influences. At the start of the project, I believed the cycles of action would possibly include observations and direct work with teachers in the classrooms around specific technology applications. However, following group coaching one I believed the teachers were autonomous and empowered and instructional coaching in school could undermine this and the sustainable solutions they were developing in school, such as, team teaching. If I repeated the project, I would engage with teachers as co-researchers and remind them that observations and coaching in school is available, should they want this. I would also like to complete the project over the course of a year with follow up

measures taken the following year to investigate the long-term sustainability of change in the context of coaching.

### 7.13 Summary

This chapter aimed to provide an honest, transparent, systematic, and holistic description of the process and findings. The three cycles of action and analysis was outlined. Reflections on the change process during group and individual coaching were presented in relation to the literature. The project findings were described in the context of the research questions aims. The contribution of the research to literature was outlined. The quality of the research and steps taken to manage bias and rigour were described. The research limitations were acknowledged and implications for future research, policy, schools, and EPs were offered. This chapter has analysed the findings and offered reflections in relation to the literature, the final chapter of this thesis will suggest conclusions from the project.

## 8 Conclusions

A vision for education technology has been espoused internationally (Department for International Development's EdTech research and innovation Hub, 2021) and in English education policy (DfE, 2021; DfE, 2022). Education technology is a key feature of the learning which when applied effectively is reported to enhance teaching and learning. However, facilitating change in education technology requires considerations around organisational conditions, individual skills and experience, and opportunities for self-directed learning. The project adopted a broad definition of education technology and aimed to enhance teaching and learning with the application of education technology. A solution-oriented coaching framework was applied over three cycles of person-centred and democratic action.

It is concluded that the solution-oriented coaching framework was successful in facilitating change in teachers' confidence and applications with technology. Individual, interpersonal, and organisational strengths, weaknesses, opportunities, and threats were considered, and planning included personalised goals and solutions at the individual, interpersonal and organisational level (Lewin, 1942; Harris, 2002; ISTE, 2021). The solution-oriented coaching appeared to facilitate new viewing and new doing around education technology (Cavanagh & Grant, 2010). At the organisational level, the solution-oriented coaching enhanced the school's vision and collaboration, and at the individual level, the coaching enhanced realistic planning towards individual goals.

The project found similar findings to previous research around factors that can enhance or inhibit applications. The findings also add to previous research which reports a positive influence of collaborative alliance (Ottenbreit-Leftwich et al., 2020; Hilaire & Gallagher, 2020; Liao et al., 2021) and that online coaching offers a helpful opportunity to facilitate change by reducing time and location constraints (Passmore, 2021). The project extends previous research around the application of a specific systemic and individual solution-oriented coaching model to facilitate education technology (Rees, 2017). Finally, the findings extend previous coaching research through the application of psychological theory to offer

explanations around the change process (Bandura, 1977; DiClemente & Prochaska, 1998; Ryan & Deci, 2000; Grant 2014; Rollnick, Kaplan & Rutschman, 2016). It is hoped these findings can provide useful insights for policy, schools, and EP practice. Future research can helpfully conduct a long-term evaluation of the solution-oriented coaching framework with different settings and stakeholders.

## 9 References

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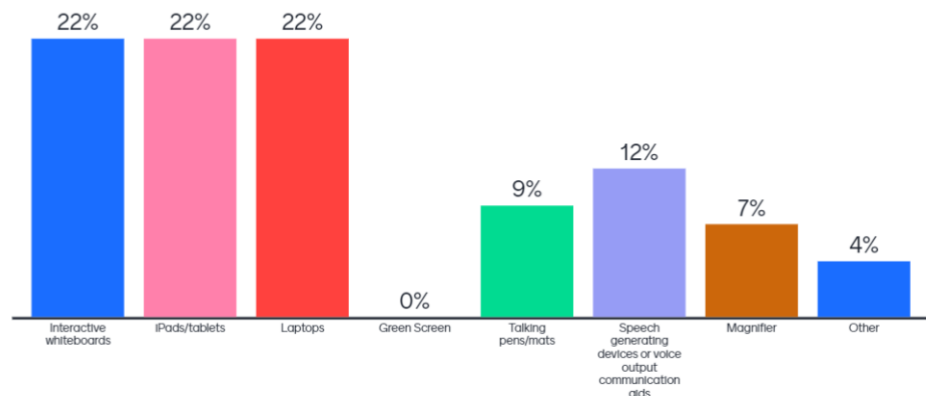
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## What type of technology have you seen used in educational settings?



## 10 Appendixes

### 10.1 Appendix A LA EPS views of education technology

Views of education technology were invited from the local authority placement educational psychology service using 'mentimeter'. Responses are presented in Figures X, X and X below.

Figure A EP views of the type of technology observed in educational settings

**If you recommend the use of particular iPad applications, software or interventions using technology please list these.** Mentimeter

ClickerWill sometimes signpost school staff/parents to <https://bdatech.org/what-technology/>

No recommendations made recently. Technology is constantly shifting! Microsoft have an excellent range of support e.g. subtitles, changing the language on presentations etc and I have mentioned this to teachers. Another favourite is Seeing AI

Don't use iPad - just Android tablet but non anyway!

Proloquo2GoAccessibility features

I haven't recommended any apps as of yet (Assistant EP)

proloquo2go ( symbol-supported communication app); Talking Mats; Precision Teaching app (Go Petey)

Sorry, I mainly state use of appropriate software. I feel that schools know better or find out which software to invest in. Also, I am not sure of the evidence base

- Clicker (whichever version we're on!)- Nesy- IDL- Reading pens

I tend to work with what the schools have available to them. I have recommended voice to speech technology such as Dragon dictate, however always remind schools there are alternatives and suggest they speak with the IT department/ specialist teacher

10

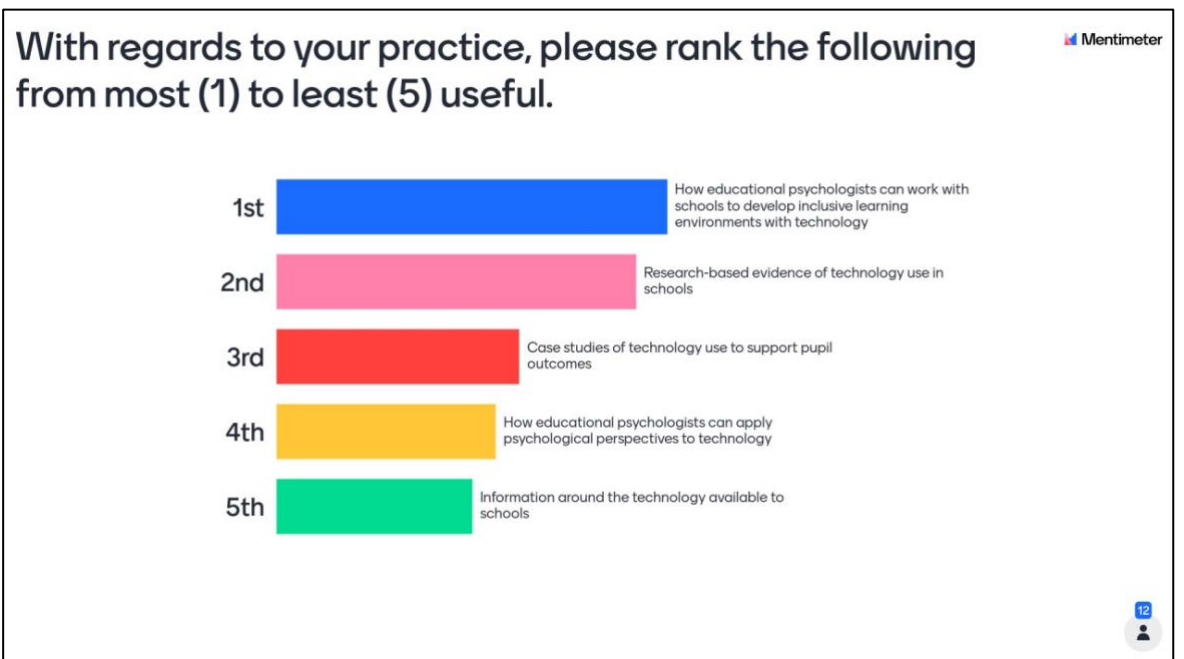


Figure B EP reports of education technology recommendations

Figure C EP views around helpful education technology research to apply to practice



## 10.2 Appendix B Research diary

### Research diary

July 2020	Draft research proposal submitted
September 2020	Placement with local authority acting as a digital champion with one other EP to support the service in the move from Skpe to Microsoft Teams.
November 2020	<p>16.11.2020 meeting with local authority specialist teacher to discuss technologies used to enhance learning, independence, and inclusion for children with visual impairments.</p> <p><u>Notes</u>            Secondary based and a level – English. A lot of work experience in secondary schools and multi sensory qualifications, experience in specialist settings. Speak to traded as well. Going to forward to traded. SEN support and little ones. First diagnosed, traumatic injury - first diagnosed, traded.</p> <p><b>What sort of technology?</b> Standard equipment, laptops and iPads. Won't fund – because not seen as non-specialist. Laptop – Nowadays children prefer iPads, children more severe won't to come back to laptops. Traded – put requests Surface pros – bigger ones, Link iPad to whiteboard – airplay, or free app vnc software. Use an APP for a bit then cotton on that someone uses it – try and get a free one. Mirroring. Liasing with school technician. Distance. 6 18 distance – 3 times closer, even if sat at font of the class, use an ipad to mirror. Sometimes school say because of data protection not allowed to do mirroring, sometimes teachers email all powerpoints to them. Does mean they can sit at the back – more flexibility. For near information – ARNIB bookshare – schools become a member – they can download books in PDF, means you can snuggle up and read a story. Oxford reading tree all free, copyright, store on easy reader, pinch and zoom to whatever font size. Back list always sharper than paper print. Facility to listen to the stories. Technicians in the past making books, can go to the library and the technicians will then make them and send them back. Suddenly in being able to choose, they can use hundreds. Trial to dragon dictate – speech to text. Ipad low vision aid – like a magnifier – e.g. a map, detail in a picture, can use the camera function, take a photo – if the teacher hasn't modified - Ipad and key board to record rather than handwriting. Primary schools hung up on handwriting. Function of the writing. Little ones – trouble with handwriting – put practice to one side – touch typing programs – 5-10 minutes daily. Teachers sending home homework and laptops via email. Skilling the children up on the laptop – getting them into good habits, 6 year old. Enormous key boards– little key words better, high viz letter in sticker forms, touch typing program – doorway online for partially sighted – bbc dance mat – big brown bear.</p> <p><b>How are they used? What are the outcomes of using this? How does it help?</b></p> <p><b>Facilitators? Barriers?</b> Cost. If it's specialist technology e.g. specialist tablets – higher spec – at some part start pixelate, prodigy human ware – special diamond edge technology Take photograph of</p>

worksheet and a page, scrolls down or across. Font size of 28 plus need to other technology, very costly, Training needs – confidence in using, or comfortable. Tension able to order if they don't have plans, most half termly visit, not enough opportunity for training. If they need more they need a plan. They can have the equipment – but not used. A lot of money. TA will say not working. Plan prodigy tablets when working wonderful, when not working terrible. In the mean time no equipment, e.g. poor connection with the tech.

Relying wholly- what are the contingencies. School should be clear in the purpose. Easy to give up when it doesn't work, don't have the manpower for technicians. The little one on board. Children become disengaged if not used. Example boy – time and person - with a diagnosis of ASC and VI. School completely embraced and good at teaching him how to use it. Grown in confidence. Access. Can do attitude. Making the time. Showing him. Timetabled time how to use it effectively. SENCO who is into IT. Blossom in confidence. Bulky equipment. Lots of paper, sloping board, laptop and ipad, Double desk, swivel chair and could move to look around. He had peer next to. Let them show everyone, use it and share it with the class. Sometimes everyone used the ipad in the group, - so it's normalising the technology with the activity, alone, some schools where everyone has one. Some parents and children cross not having an ipad. Different schools do it really well.

**Hopes for the future?** Big issue buying equipment for children but there's not training package along that. Hard. Videos of what the looks like. A course they could book with traded team. This how we teach. Not enough members of staff, time, back in the day offered. Staffing levels and caseloads. Needs to be support and training with any equipment. E.g. touch typing. TAs in some LAs teach touch typing. Thought we've been clear. Still see clunking. Found an app on an ipad. Teachers overcome the pain barrier in using – The other end effectively a skill for life.

20.11.2020 discussion with Lee Parkinson around how he works with schools to implement technology. Lee reflected how technology can enhance the curriculum, assessment and reduce teacher workload.

24.11.2020 meeting with senior sensory technician for local authority inclusion service to discuss assistive technologies used.

#### Notes

Different types of technology depending on the child, all different types of specialisms Hearing impaired sound field systems. Each specialism different technology. Teacher assessments – which would work. ACE centre north, lending library – communication aids. Assistive technology – Specialist teacher in toe -

Assessment kit – used to have comprehensive – a lot years of experience. Trial systems in place – review – then purchase of equipment budget – ring fenced – contribution schools forum. Limit to LA but then school can look to buy in,

Speech discrimination test – pre and post. Attentive in class – learning outcomes – functions – opening up. Specialist equipment specialist areas. School technology – emphasising – infrastructure – separate bits that work on their own. A few years ago, a girl with PD – wheelchair – limited motor functions, joy stick on one side, changed it

	<p>around so PC could be accessed through wheelchair. A lot of families are aware, will seek out – settings – forums as well. How do we capture this – follow a few through – APD – Auditory processing disorder- isn't really any answers, letters from health. May benefit from equipment, health, different types – assistive listening devices – teacher of the deaf . VI – each of sensory specialisms, have their own issues. School technician, how it integrates into school infrastructure- varying success – willingness of technicians – even though purchased – some technicians who don't want to know – majority willing to integrate – HI transmitter – routines – Older teachers – Building schools for the future money – every class had a sound field system, in Australia and Canada used all the time, quiet the class down. Don't know why you wouldn't use, cultures, money put into schools – school are built around- Norway – each child has a method of speaking into wider sound field – microphones – different microphones on the desks – Whiteboards – used to install, can integrate into the whiteboard, can put software on the device, if used with the right lighting conditions – older projector with bulb about to go. Every school different – been in every school. Short stay school - Negative when things haven't been delivered. Low tech approach first, not so confusing to the child. Similar to VI – cctv or magnifier – access to curriculum and independence. Tech changes over time How do specialist teachers plan how they integrate. Statutory side – more of a guiding approach. Not as much hand on. Private teachers – difficult to access. Collaboration between SEND professionals.</p> <p>24.11.2020 I invited views of the educational psychology service about technology via Mentimeter (See stakeholder engagement).</p>
December 2020	<p>4.12.2020 meeting with educational psychologist to discuss iPad training offered by Cornwall educational psychology service to schools. Reflection around the focus of my research to look at teaching and learning and differentiation rather than specific intervention.</p> <p>Presented thesis proposal to year 2 and year 1 TEPS and university tutors.</p>
May 2021	10.5.2021 Ethics application approved
June 2021	Discussion with EdTech demonstrator school to invite participation to the research. The DHT did not think the school would be able to assist in the aims of the research because technology is already embedded in the school (all children have a device each).
July 2021	Draft literature review
September 2021	10.9.2021 Academic tutorial reflection around if SFC and dynamic fit together, decision taking to focus on SFC as a framework to facilitate change generally, rather than focusing on dynamic assessment. Reflection around the differences between consultation and coaching.

October 2021	<p>12.10.2021 meeting with senior leader to introduce research aims, SF framework, timeline, and commitment involvement. Captured demographic information about school and strategic hopes around technology.</p> <p>26.10.2021 Academic tutorial reflection around scope of the literature and where to focus review. Reflection around who to complete the SFC with, individual or group coaching and the advantages and disadvantages each brings. Decision taken to discuss the options of this with the school.</p> <p>27.10.2021 Minor amendment to ethics application approved.</p>
November 2021	<p>10.11.2021 group SFC in school with all teaching staff. Further details on my reflections on the process are presented in the findings chapter.</p> <p>25.11.2021 Academic tutorial, talking through the ‘mess’ in involvement with parents but they then didn’t come to Teams meeting. Agreed staff would discuss the possibilities and challenges in using technology at parents evening, including modelling devices. Reflection around using activity theory and narrative inquiry as an approach to analysis.</p>
December 2021	<p>Attended Equality, diversity, and inclusion at work webinar, looking at organisational behaviour and how digital tools can be leveraged to support inclusion and connectedness when working from home.</p> <p>3.12.2021 Teams video call with senior leader to check in. Changed from Teams to Doodle for homework system (tried in one class working well and now rolling out) and change in ordering tablets instead of iPads so that more can be ordered (more detail in findings chapter). DHT shared that staff are still keen to complete some individual coaching sessions.</p>
January 2022	<p>5.01.2022/6.01.2022/7.01.2022 Individual coaching sessions. Reflected that SFC 2 felt better because I focused some questions, such as, ‘so if I came into your classroom in the summer term what would I see, what would be different?’. Friday feeling more fluent in facilitating the process.</p> <p>Watched Kenneth Gergen talk – models of education, technology for collaboration and a curriculum with project-based learning that promotes relating first.</p> <p>21.01.2022 Academic tutorial discussion around how to present findings in the SWOT and that it didn’t seem helpful to complete a SWOT of individual sessions as this would then lose some of the rich detail of individual experiences.</p> <p>28.01.2022 meeting with senior leaders to discuss SWOT of group and individual coaching session feedback. Agreement on next steps to complete a group SFC to review outcomes, think about implementation policy and technology for pupils learning English as an additional language specifically.</p>
February 2022	<p>18.02.2022 Draft methodology chapter.</p> <p>23.02.2022 final group coaching with all teachers (except senior leaders)</p>

March 2022	Feedback meeting with senior leaders, invite member checking of SWOT.
April 2022	Analysis and project write up.
May 2022	Submit thesis. Research findings to be shared during local authority EPS service day and at North West Association of Educational psychologists conference in December 2022.

### 10.3 Appendix C COVID-19 educational context

In March 2019, countries around the world took measures to reduce the spread of COVID-19. Educational professionals quickly responded to create a remote learning provision using technology such as, learning platforms, Microsoft Teams and Zoom. Resources were put in place to promote digital equality, including a device and Wifi infrastructure, National tutoring programme and 'catch-up' funding (DfE, 2020). This was later followed by a £10 million scheme which offered specialist training and materials to help pupils to 'catch-up' in core subjects following disruptions to learning (DfE, 2021). During remote learning, a survey of schools indicated that some pupil engagement with home learning was low (NAACE, 2020). A similar finding was reported by Nesta (2021) which found the adoption of learning platforms was lower in schools with more children eligible for free school meals and while the device disadvantage gap narrows, there are still significant barriers that appear to disproportionately impact disadvantaged children as they noted an 'engagement gap' persisted across the 2020-2021 academic year. The short-term implications of school closures on pupil attainment for pupils who receive free school meals is worse and it is not surprising that the 'disadvantage gap' is estimated to widen further (EEF, 2021; Ofsted, 2020). Pupils with special educational needs and disabilities (SEND) have also experienced difficulties accessing online learning and teaching activities that do not have appropriate assistive technology (AT) (DfE, 2020). In 2020-2021, there were 325,618 pupils with an Education Health and Care plan and 1,083,083 pupils receiving special educational need support (DfE, 2021).

Furthermore, when schools re-opened, some clinically vulnerable children and young people and educational professionals were unable to return to school following 'shielding' guidance. Schools also operated under the guidance of Personal Protective Equipment and 'class bubbles', this meant that children were taught in consistent groups and if a member of class tested positive the class were required to self-isolate for a period of 10 days. Unfortunately, disruptions to learning continued until July 2021 as pupils and members of staff were forced to self-isolate sometimes repeatedly over a term (DfE, 2021). There is not only the potential for negative short-term implications in terms of pupil wellbeing and gaps in learning (EEF, 2021; Hodder Education and SchoolDash, 2020; Welsh

Parliament, SENEDD, 2021), but also potentially long-term implications on pupil attainment (Centre for Education Policy and Equalising Opportunities, 2020) and life chances (DELVE, 2020). Educational provision must therefore be underpinned by evidence that is shown to make a difference in improving educational outcomes for all pupils.

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#### 10.4 Appendix D DfE (2019) Education Technology Strategy

The Department for Education (2019) Education Technology (EdTech) strategy proposes a vision of how technology can improve workload, efficiency, accessibility and inclusion, teaching and student outcomes. The EdTech strategy espouses that this represents a “new era” for schools to be able to “realise the potential” of technology by “harnessing” the potential of technology to support learners (DfE, 2019; DfE, 2020). This also includes the use of AT, as the DfE (2020) found that AT is an under-utilised intervention (DfE, 2020, p7) and that this is problematic because AT can be used to support the academic, personal and social outcomes for all pupils and remove historical barriers to CYP reaching their potential (DfE, 2020). The strategy has identified five key areas of opportunity where technology can shape change: reducing administration tasks, more efficient and effective assessment, development of teaching practices that support access, inclusion, and outcomes for all, professional development for teachers and supporting decisions about work or further study.

Schools can identify and trial technology products through the British Education Suppliers Association and LendED, access free training through the Chartered College of Teachers and support and best practice from a series of demonstrator settings. In the strategy, it is acknowledged that there are barriers to the use of technology in levelling the playing field for learners (DfE, 2019, p40). To overcome some barriers, the following is proposed: a modern infrastructure internet connections and devices, development of teacher’s digital capability and skills, leadership to instigate change and to empower educational professionals, and an awareness of available tools and subject knowledge to make decisions around which technology to use. In 2021 to 2022, the strategy moved into phase 2, with three tiers of support offered to schools based the needs of each setting (DfE, 2019). An interim and final evaluation will be completed to assess the demonstrator schools use of EEF (2019) digital technology report.

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## 10.5 Appendix E Learning theories applied to technology

### Behaviourist approaches to teaching and learning with technology

From a behaviourist perspective, learning is confined to the observable behaviours of learners and a traditional, teacher-directed transmission-based model of education (Ertmer and Newby, 2013 p48). The process of learning involves learning facts and rewarding recall of this content-based information and conditioning the extinction of incorrect responses (Bower, 2017). With this theoretical lens, attention is paid to how the environment can reinforce this behaviour through questions, response, and reinforcement sequence. Examples of applying behaviourist principles with technology includes the use of software that reinforces a particular behaviour, providing assessment data and in some instances opportunities to give quick feedback, such as, classroom quiz's (Bernacki, Crompton and Greene, 2020). This approach could be conceptualised as Technology-Enhanced (TET) which is concerned with pedagogical approaches used (Passey, 2019). However, it could be argued, in this context, a classroom quiz could also bring a motivating element for some learners (Ryan and Deci, 2000), and this approach is limited in providing opportunities for collaborative, creative thinking around ill-structured problems.

### Cognitive approaches to teaching and learning with technology

In contrast to focus on the evidence of observable learning, cognitive theories of learning focus on the instantaneous internal processes of how information is processed by pupils, such as attention and memory (Bower, 2017, p41). Cognitive theories propose that only a limited information can be processed at any one time and that representing information visually and verbally information can be processed more easily (Mayer and Moreno, 1998). The implications of this for teaching and learning lead to a focus on optimising the presentation of information (Bernacki, Crompton and Greene, 2020), opportunities for distributed practice, interleaved learning, retrieval practice (Hughes and Lee, 2019) and teaching learners' awareness and approaches to manage the cognitive demands on learning (EEF, 2019, p22).

From a cognitive perspective of learning, it could be argued that this offers technology enhanced learning through the ways that technology can be used to manage learning approaches (TEML) by reducing overload and enhancing memory processes (Passey, 2019). The design features of some technologies help children to learn adapt difficulty, they vary in visual and audio presentation, give feedback about performance, opportunities to repeat problems previously solved incorrectly, opportunities for repetition, distributed practice and interleaved learning (Bower, 2017; Bernacki, Crompton and Greene, 2020).

### Social Constructionist perspectives on teaching and learning with technology

From a constructivist perspective, individuals actively construct understanding based on experience, learning is assimilated into what the learner already knows and how this is then adjusted to make sense (Bower, 2017; Ertmer and Newby, 2013). This approach acknowledges cognitive processes of perception, memory, and attention in the context of unique and changing social and cultural influences on learning and development (Kozulin, 2002, p13). In contrast to reinforcing the recall of content or maximising opportunities for processing and retention, the purpose of learning from this perspective is to support the learner to become a competent learner. A social constructivist approach emphasises the role of mediation through interpersonal process of discussion, modelling and negotiation between learners, parents, and teachers (Kozulin, 2002).

Two key theoretical perspectives in this approach includes Vygotsky's sociocultural theory (1978). Learning takes place in the context of systemic factors in the family, education and wider society, and interactions with adults and symbols (Vygotsky,1978). Learning outcomes are shaped by the mastery of symbolic mediators which support cognitive organisation and learning processes. The process of learning can be scaffolded in the 'Zone of Proximal development' by modelling the task and associated strategies differentiated to competence, through the gradual removal of support from a knowledgeable other learning becomes internalised (Vygotsky, 1978). The symbolic mediators available change over time and will influence the type and levels of mediation necessary,

without mediation the symbolic mediators according to this theory are “useless” to learners (Kozulin, 2002, p19).

Through intentional communication of meaning around a stimuli adults can create “...a structural modification in the cognitive functioning of the individual...” (Kozulin, 2002, p11). There are two types of mediation, the adult needs to provide to support learning outcomes or the sort of changes in the learning environment with symbolic-tool-mediators (Kozulin, 2002, p14). This implies that difficulties in learning could reflect the nature and quality of the scaffolding provided in the learning process (Lauchlan and Carrigan, 2013). The teacher plays a central role in facilitating discussing strategies about learning and collaboration and creating conditions that encourage processes of inquiry, agency, and collaboration. Technology could be conceptualised as a symbolic mediator in development, including how technology can enhance teaching and learning and how teachers can mediate this process (Passey, 2019). Technology can facilitate constructivist learning with active, engaged, meaningful, and socially interactive experiences (Hirsh-Pasek et al., 2015) and scaffolding (Crompton, Bernacki and Greene, 2020).

### Cognitive, emotional, and individual aspects of learning

The science of learning indicates that humans learn more effectively when they are not anxious, fearful and hold self-belief, engagement, and attitudes (Darling-Hammond, Flook, Cook-Harvey, Barron and Osher, 2020). Please see examples provided in the literature review.

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## 10.6 Appendix F Systematic literature review appraisal

### **Weight of evidence scoring**

The studies are numbered as follows: Grierson, Gallagher, and Hilaire (2022) study 1, Zimmer and Matthews (2022) study 2, Liao, Ottenbreit-Leftwich, Glazewski and Karlin (2021) study 3, Hilaire and Gallagher (2020) study 4, Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding and Guo (2020) study 5 and Hutchinson and Woodward (2018) study 6. Each study was evaluated using the following criteria. If the studies fully met the criteria, they were given a score of 2, 1 for partially meeting the criteria, and 0 for not meeting the criteria. Studies were then given a weight of evidence score as follows:

- Weight of Evidence A overall quality of the research  
  
0-5 (low), 6-9 (medium), 10-14 (high)
- Weight of Evidence B Relevance and appropriateness of the design to the review question  
  
0-3 (low), 4-6 (medium), 7-8 (high)
- Weight of Evidence C Relevance and appropriateness of research focus to the review question  
  
0-3 (low), 4-7 (medium), 7-10 (high)
- Weight of Evidence D Overall appraisal was captured drawing upon an average of these to give an overall weight of low, medium, or high judgement.



Weight of Evidence A scoring

	<b>Study 1</b>	<b>Study 2</b>	<b>Study 3</b>	<b>Study 4</b>	<b>Study 5</b>	<b>Study 6</b>
Is the experience of participant teachers clearly described?	0	2	2	2	0	2
Is the coaches' training and supervision in coaching described?	1	0	0	1	2	1
Does the study define the education technology focus?	1	1	0	1	1	1
Is the coaching model clearly described?	1	1	1	0	2	1
Is the coaching context clearly described (in person or online)?	2	1	2	2	2	2
Is the coaching frequency clearly described?	1	1	2	0	2	1
Is the data analysis method described?	2	2	2	1	2	2
<b>Overall score</b>	Medium	Medium	Medium	Medium	High	High

Weight of Evidence B Scoring

	<b>Study 1</b>	<b>Study 2</b>	<b>Study 3</b>	<b>Study 4</b>	<b>Study 5</b>	<b>Study 6</b>
Does the study explore coaching teacher's professional development with technology?	2	2	2	2	2	2
Does the study use a mixed methods or qualitative design?	2	2	2	2	2	2
Does the study use relevant analysis including triangulation of change over time in the context of coaching?	2	2	2	2	2	2
Does the coaching take place over a minimum of two months to allow change and evaluation?	2	2	0	2	2	2
<b>Overall score</b>	High	High	Medium	High	High	High

Weight of Evidence C Scoring

	<b>Study 1</b>	<b>Study 2</b>	<b>Study 3</b>	<b>Study 4</b>	<b>Study 5</b>	<b>Study 6</b>
Does the study focus on education technology professional development?	2	2	2	2	2	2
Does the study use a specific coaching model?	0	1	1	0	2	1
Is the study with primary school settings?	2	2	2	2	2	2
Does the study describe change in individual teacher's education technology practices over time?	1	1	1	1	1	2
Does the study describe change in organisational education technology practices over time?	0	0	0	0	0	2
<b>Overall score</b>	Medium	Medium	Medium	Medium	High	High

Weight of Evidence assessment detail

Authors	Rationale
Grierson, Gallagher, and Hilaire (2022)	<ul style="list-style-type: none"> <li>• Triangulation of data sources</li> <li>• Conducted over 8 months</li> <li>• Details provided around the coach’s experiences in teaching and technology.</li> <li>• Qualitative data around the attributes of a successful coach.</li> <li>• 31 teachers’ views were invited.</li> <li>• Member checking of interview transcripts.</li> <li>• In the discussion, the authors describe the coach ‘mentoring’ teachers.</li> <li>• The coach did not have previous training, experience, or supervision in coaching.</li> </ul>
Zimmer and Matthews (2022)	<ul style="list-style-type: none"> <li>• Triangulation of data sources</li> <li>• Conducted over 8 months</li> <li>• Virtual professional coaching model described</li> <li>• Effective aspects of the coaching model are explored</li> <li>• Doesn’t specify how teachers completed the coaching ‘...<i>teachers participated as much as possible each week...</i>’(Zimmer and Matthews, 2022, p9).</li> <li>• Description of resources shared with teachers not provided.</li> <li>• Details about the coaches, their experience, and supervision is not provided.</li> </ul>
Liao, Ottenbreit-Leftwich, Glazewski and Karlin (2021)	<ul style="list-style-type: none"> <li>• School context described (1:1 iPad initiative and technology specialist shared by schools).</li> <li>• Qualitative and quantitative findings triangulated (observations, interviews, and artifacts)</li> <li>• Only three teachers included.</li> </ul>

	<ul style="list-style-type: none"> <li>• Details of coaching activities completed with each teacher are described.</li> <li>• The coach's training in coaching or supervision is not described.</li> <li>• Teachers participated in technology workshops and coaching project prior to this project. Participants already had a relationship with the coach and outcomes could have been influenced by this.</li> </ul>
Hilaire and Gallagher (2020)	<ul style="list-style-type: none"> <li>• Describes how the teacher's professional learning was supported through iterative cycles.</li> <li>• Describes the actions of the coach in facilitating the process.</li> <li>• Small participant size (4 teachers)</li> <li>• Does not include a definition or model of coaching.</li> <li>• Does not give descriptions of data the authors said they collected.</li> </ul>
Ottenbreit-Leftwich, Liao, Karlin, Lu, Ding and Guo (2020)	<ul style="list-style-type: none"> <li>• Coaches experience described</li> <li>• Context described including access to district coach</li> <li>• Coaching model described</li> <li>• Case study method examined coaching process in context and provided information around barriers and facilitators.</li> </ul>
Hutchinson and Woodward (2018)	<ul style="list-style-type: none"> <li>• The design helpfully explores the influence of coaching with context information around barriers and facilitators provided.</li> <li>• The coaches received training in how to use the model.</li> <li>• Pre and post measures and triangulation of qualitative and quantitative measures.</li> <li>• The survey of pupil applications of technology included a large sample size (1,335 participants).</li> <li>• Measures of teacher's applications of technology were captured from October to April</li> <li>• Changes in the types of technology teachers applied and how this changed was described.</li> </ul>

	<ul style="list-style-type: none"><li>• Details around the coaching sessions were not captured.</li><li>• The individual experiences around the coaching process and how this facilitated change was not considered.</li></ul>
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## 10.7 Appendix G Research interest letter to head teachers



### Research Information Sheet

Title of project: A collaborative action research study using coaching to facilitate teaching and learning with technology in the primary school classroom.

Ethics Approval Number or Taught Project Archive Number: S1322

Researcher(s): Stephanie Hunt (stephanie.ormrod@nottingham.ac.uk)

Supervisor(s): Dr Victoria Lewis (Victoria.Lewis@nottingham.ac.uk)

I am a trainee Educational Psychologist in the third year of a doctoral training course on placement with an Educational Psychology service. I am writing to you about a piece of research I am conducting as part of my doctorate training at the University of Nottingham.

I am interested in how schools can use technology to enhance learning. The research will be collaborative and that means drawing upon what would be most valuable to the school. The research project will involve an initial training input with the researcher, and this could be followed by three coaching sessions over the Autumn and Spring Term (these could be completed individually with a class teacher or a group of teachers). The researcher can also provide input on the use of a dynamic assessment tool with technology should this be of interest to the school. At the start of the project, I will meet with the head teacher to understand what would be most helpful and feasible in school. I would like to complete interviews with the staff and a group of pupils around their views of the project. Please note the research will be completed in line with your COVID-19 risk assessment. If you would like to express interest in the project or you would like more information, please contact me on the details provided below.

Kind regards,  
Stephanie  
Stephanie Hunt  
[Stephanie.ormrod@lancashire.gov.uk](mailto:Stephanie.ormrod@lancashire.gov.uk)  
01524 585610  
Trainee Educational Psychologist

## 10.8 Appendix H Consent form



The University of  
**Nottingham**

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### **School of Psychology Consent Form for teaching staff**

Title of project: A collaborative action research study using solution focused coaching to facilitate teaching and learning with technology in the primary school classroom.

Ethics Approval Number or Taught Project Archive Number: S1322

Researcher(s): Stephanie Hunt (stephanie.ormrod@nottingham.ac.uk)

Supervisor(s): Dr Victoria Lewis (Victoria.Lewis@nottingham.ac.uk) The participant should answer these questions independently:

- Have you read and understood the Information Sheet/Letter? YES/NO
- Have you had the opportunity to ask questions about the study? YES/NO
- Have all your questions been answered satisfactorily? YES/NO
- Do you understand that you are free to withdraw from the study? YES/NO

(at any time and without giving a reason)

- I give permission for my data from this study to be shared with other researchers provided that my anonymity is completely protected. YES/NO
- Do you agree to take part in the study? YES/NO

This study has been explained to me to my satisfaction, and I agree to take part/that my child can take part. I understand that I am free to withdraw at any time.

I agree that I wish to take part in interviews with the researcher and classroom observations completed by the researcher and that notes can be taken during these observations.

I understand that the interview/focus group will be audio recorded and that the data will be anonymised and remain confidential. I understand that the recording will be deleted following transcription of the interview/focus group.

Signature of the Participant:

Date:

Name (in block capitals):

Preferred pseudonym to be used in the research:



## 10.9 Appendix I Individual goal setting form

### Individual goal setting form

Name: \_\_\_\_\_

Preferred Pseudonym: \_\_\_\_\_

Role(s) in school: \_\_\_\_\_

Number of years teaching: \_\_\_\_\_

Technology that you use in the classroom:  
\_\_\_\_\_

How often do you use this technology (daily, weekly, termly): \_\_\_\_\_

Thinking about technology, on the scale below please indicate with the initial letter where you would place your:

Knowledge (K)

Confidence (C)

Skills (S)

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

1 10

A little Somewhat A lot

With regards to your goals with teaching and learning with technology, where would you like to be:

1. In 1 month, I want to be able to: \_\_\_\_\_

2. By February 2022 I want to be able to: \_\_\_\_\_

Go back to the line and circle with a different colour where you want your skills, knowledge and confidence to be by February 2022.

What will help you to get there? \_\_\_\_\_

## 10.10 Appendix J Presentation of aims and framework to setting



SOLUTION FOCUSED COACHING TO FACILITATE EDUCATION TECHNOLOGY

### OVERVIEW

- Introduction to the research
- Group discussion around technology and learning in school
- Comments questions, reflections
- Next steps
- Option/if time to discuss learning theories



### INTRODUCTION TO THE RESEARCH

- About the researcher
- Purpose – to facilitate teaching and learning with technology through a solution focused coaching framework
- What is action research?
- What is solution focused coaching?
- Consent form, research information sheet and recording



## GROUND RULES

### WHAT IS WORKING WELL ALREADY WITH REGARDS TO TEACHING AND LEARNING WITH TECHNOLOGY?

- Interactive whiteboards, TTRockstars (Times Table Rockstars), Reading Eggs (Limited number of logins), IDL2 Mobile, Learn English with Lingo Arcade PRO, [www.spellingframe.co.uk](http://www.spellingframe.co.uk), [www.mymaths.co.uk](http://www.mymaths.co.uk), [www.ruthmiskin.com](http://www.ruthmiskin.com) (Read, Write, Inc.)

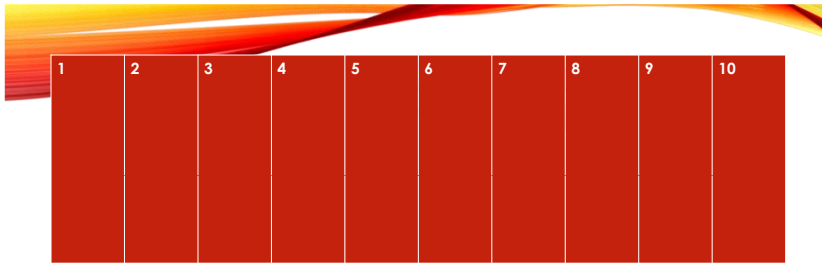


### WHERE DO WE WANT TO BE AS A SCHOOL THAT USES TECHNOLOGY TO FACILITATE TEACHING AND LEARNING?

WHAT COULD BE EVEN BETTER?



- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.



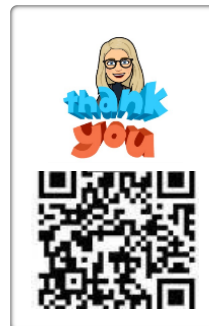
The  
best it  
can be

## INDIVIDUAL GOAL SETTING 5 MINUTES

- Where are we now as individuals?
- Where do we want to be?
- How will you get there? What do you need? Who do you need?

## COMMENTS, QUESTIONS, REFLECTIONS

- Next steps , individual, pair, group solution focused coaching? Observations?
- Pupils? Teaching assistants? Parents?
- Padlets?  
[Teaching Team \(padlet.com\)](#)  
[Pupil ideas and questions \(padlet.com\)](#)  
[Parents and carers \(padlet.com\)](#)



## 10.11 Appendix K Debrief procedure

The researcher will tick when completed following the SFC:

- Explained that the coaching session has finished and thank the participant for their time.
- Outlined the topics that were discussed during the coaching session.
- Checked on the participants wellbeing, asking them sensitively:
  - How they found the coaching process
  - Whether any of the subject matter or content that was discussed was uncomfortable or upsetting for them and signpost to support as necessary
- Explained the next steps in the research
- Provided the participant with the opportunity to ask any questions and provide an email address for the participant to ask any questions in the future
- Reminded the participant of their right to withdraw at any point, including following their interview
- Offered the participant the opportunity to review the analysis of their data and provide feedback
- Offered the participant the opportunity to receive a copy of the completed piece of research

## 10.12 Appendix L Local authority guidance around remote working

### **Setting & parent/carer agreement**

As a consequence of the current Covid-19 pandemic, some services provided by teams within the Inclusion Service (including the Educational Psychology Team and Specialist Teaching Team) are being delivered via remote/virtual means. Remote means may include video contact in line with local authority advice and guidance.

#### **What this means for working with settings:**

Inclusion Service staff will liaise with educational settings and parents/carers to discuss the preferred means of undertaking virtual/remote visits. Settings will have varying capacity to work in virtual/remote ways.

Where staff from the Inclusion Service, educational settings and parents/carers agree to undertake visits via remote means with video facility, this will be hosted via Microsoft Teams, which is the approved, secure video-conferencing platform provided by the local authority.

Whilst video clips could be shared within video-based meetings, these should not be sent to the Inclusion Service staff directly.

In order to ensure that we are able to work successfully through the use of video visits, whether these are video based meetings or live stream observations, it is important that the following guidelines are adhered to:

- Participants in the call should be in suitable spaces e.g. office, classrooms, living spaces if in homes, etc.
- Participants in the call must ensure that any personal information cannot be overheard or overseen by anyone not authorised to have access to the information being discussed.
- Participants in the call must be mindful of their surroundings (both physical and virtual) and must not have any information visible on their screens or on display in the background or on desks/working spaces that can be seen by other participants.
- Adults who have responsibility for a child/young person's supervision arrangements must be present within the environment when Inclusion Service staff are meeting virtually with a child or young person who is at home or at school. For safeguarding reasons, parent/carers must be in the house if the child is at home. The adult may be in a room close by, just outside the room, door ajar, or in view. The session will have to be terminated if a child/young person is left alone in the house.  
**Responsibility for the safety of the child remains with the adults present within the home/school environment.**
- Sessions must not be recorded, screen captures taken etc. by anyone involved in the meeting (i.e. setting staff, Inclusion Service staff or parents/carers). This should be reiterated/re-stated at the beginning of the video-based session.

- Participants are responsible for verifying that individuals invited into conferencing sessions are from a genuine and trusted source and that invitations are sent to the correct email recipients.
- Staff from the Inclusion Service continue to work within the local authority and Inclusion Service policies, including those in relation to information governance and safeguarding children.

All information gathered by Inclusion Service staff from these visits will be stored safely and securely in line with UK GDPR. Further information is available on the SEND privacy notice.

### **Right to refuse or withdraw consent:**

Parents/carers, setting staff and young people over the age of 16 have the right to refuse or withdraw their consent to participate in any of the below remote/virtual working activities at any time. In this event, Inclusion Service staff will liaise with educational settings, parents/carers and young people to discuss the preferred means of undertaking support and assessment services with respect to Covid-19 restrictions. This may involve, for example, telephone contact, contact via email and/or arrangements to undertake activities in person, where this can be carried out in line with Covid-19 Inclusion Service risk assessment and guidance. Should you wish to withdraw your consent, or raise any queries about this, you can contact our Business Support Teams on the following email addresses.

### **Parent/carer agreement:**

**I understand** that the alternative means available for delivering support from staff within the Inclusion Service includes video-based visits.

**I agree** to discussion/consultation taking place about my child by Inclusion Service staff with educational setting staff within a video-based meeting/conference-type call, where appropriate and possible.

**I agree** to live stream observation of my child in the educational setting by Inclusion Service staff, where appropriate and possible.

**I agree** to videos of my child within the setting being shown by educational setting staff to Inclusion Service staff within a video-based meeting/conference-type call, where appropriate and possible.

**I agree** to my child participating in a video-based meeting with Inclusion Service staff, where appropriate and possible.

**I agree** to participate as a parent/carer in a video-based meeting with Inclusion Service staff, where appropriate and possible.

### **Setting agreement:**

**I understand** that the alternative means available for delivering support from staff within the Inclusion Service includes video-based visits.

**I agree** to setting staff participating in discussion/consultation with Inclusion Service staff within a video-based meeting/conference-type call, where appropriate and possible.

**I agree** to setting staff facilitating live stream observation of the focus child in the educational setting by Inclusion Service staff, where appropriate and possible.

**I agree** to videos of the focus child within the setting being shown by educational setting staff to Inclusion Service staff within a video-based meeting/conference-type call, where appropriate and possible.

**I agree** to setting staff facilitating participation by the focus child in a video-based meeting with Inclusion Service staff, where appropriate and possible.

#### **Young Person (aged 16 years and over)**

**I understand** that the alternative means available for delivering support from staff within the Inclusion Service includes video-based visits.

**I agree** to discussion/consultation taking place about me by Inclusion Service staff with educational setting staff within a video-based meeting/conference-type call, where appropriate and possible.

**I agree** to live stream observation of me in the educational setting by Inclusion Service staff, where appropriate and possible.

**I agree** to participate in a video-based meeting with Inclusion Service staff, where appropriate and possible.

**I agree** for my parent/carer to participate in a video-based meeting about me with Inclusion Service staff, where appropriate and possible.



## 10.13 Appendix M Ethics Approval



School of Psychology  
The University of Nottingham  
University Park  
Nottingham  
NG7 2RD

tel: +44 (0)115 846 7403 or (0)115 951 4344

Wednesday 27<sup>th</sup> October 2021

Ref: **S1376 Chair Approval**

Dear Victoria Lewis and Stephanie Hunt,

**Title of the new project:** A collaborative action research study using a solution focused coaching framework to enhance teaching and learning with technology in a mainstream primary school

**Applicant:** Stephanie Hunt

Details of the previous study:

**Applicant:** Stephanie Hunt

**Title of the Previous study:** A collaborative action research study using coaching to facilitate dynamic assessment with interactive whiteboard applications in the primary school classroom

**Date of approval:** 10.05.2021

**Reference number (if known):** S1322

As Chair of the Ethics Committee I have considered your request and I am happy to grant approval for the following changes:

- The researcher will use a solution focused coaching framework to enhance technology use in a mainstream primary school. This will begin with a solution focused group coaching session with all staff. This will be followed by individual or group solution focused coaching sessions. Some aspects of the coaching session may also include instructional coaching.
- The researcher intends to first pilot a solution focused coaching session with a teacher from a school which the researcher is a link trainee educational psychologist, this will be observed by an educational psychologist from the researcher's placement educational psychology service. The educational psychologist will provide feedback to the researcher on the solution focused principles used. The educational psychologist will observe at least one more coaching session during the research.
- Each participating teacher will complete an individual questionnaire around their skills, knowledge, and confidence in using technology (this is the same as the original study).



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- Three Padlet websites will be used to capture anonymous information from staff, pupils and parents throughout the project (the Padlets will be closed at the end of the research).

- The researcher will offer opportunities to the teachers to complete a narrative observation to support discussions around the use of technology (this is the same as the original study).

- The research intends to end the project with a focus group with pupils and a meeting with all staff to identify next steps (this is the same as the original study).

- All discussions will be audio recorded and stored in line with GDPR guidelines. At all stages of the research, the researcher will follow the local authority guidance on remote working. Participants will continue to hold the right to withdraw from the study at any time and for any reason, up to the point of data transcription.

Final responsibility for ethical conduct of your research rests with you or your supervisor. The Codes of Practice setting out these responsibilities have been published by the British Psychological Society and the University Research Ethics Committee. If you have any concerns whatever during the conduct of your research then you should consult those Codes of Practice.

Independently of the Ethics Committee procedures, supervisors also have responsibilities for the risk assessment of projects as detailed in the safety pages of the University web site. Ethics Committee approval does not alter, replace, or remove those responsibilities, nor does it certify that they have been met.

Yours sincerely

*Professor Stephen Jackson*  
*Chair, Ethics Committee*

#### 10.14 Appendix N Solution-oriented coaching session description

Before a coaching session the coach will ask about pre-session change as this sets the context and assumption that change is already happening and will continue to take place. This is often followed by problem-free talk which gives an authentic opportunity to develop a working relationship. During the coaching session, the coach considers when to draw the coaches attention to a strength, by reflecting back and highlighting a strength with an example shared around when the coachee was managing the situation well. A 'miracle question' involves asking the coachee to imagine a miracle took place and the problem no longer existed, here the coachee can identify what is different in the situation and their actions. Scaling can be used to explore the coachee's current position, where they want to be and what realistic steps and strategies will help them move along the scale. Coaching sessions typically end with feedback to the coachee around their strengths and contributions and a summary of the goals and strategies discussed. Coaching typically concludes with agreement with the coachee (Cavanagh and Grant, 2010, p62).

## 10.15 Appendix O Group one SWOT summary

### Group coaching 1 SWOT summary

Strengths	Weaknesses
<p data-bbox="261 387 922 450"><i>What is positive/helpful about the education technology in school? How does it influence learning?</i></p> <ul data-bbox="309 479 922 1205" style="list-style-type: none"> <li>• Resources such as, 'Read Write Inc' online video models for practice, homework and overlearning. Positive parent feedback about this resource.</li> <li>• Assessment via Kahoot</li> <li>• Times tables Rockstars motivating for some pupils. Facilitates distributed practice and children bring this knowledge into maths lessons.</li> <li>• Hit the button and Numbots works well for developmental stage in KS1 as it's easy to use.</li> <li>• Racing to English and IDL</li> <li>• Children engaged and motivated to use the interactive whiteboards.</li> <li>• Visualisers to share work.</li> <li>• Use of videos during teacher modelling e.g. reading stories teachers feel children listen more.</li> <li>• Mirroring to share examples of work.</li> <li>• Purple Mash rich resource.</li> <li>• ITPs to model concepts.</li> <li>• Facebook sharing information with families.</li> <li>• School website sharing information.</li> </ul>	<p data-bbox="948 387 1490 450"><i>What is challenging about using technology? How is it not helpful?</i></p> <ul data-bbox="995 479 1474 1285" style="list-style-type: none"> <li>• Teacher confidence and not feeling skilled are then not using technology.</li> <li>• Some staff not aware of technology available, e.g. IDL and racing to English or laptops.</li> <li>• Teachers not sharing practice around technology.</li> <li>• Difference in the type, frequency and how technology is being used.</li> <li>• None of the teachers are using the 15 laptops in school.</li> <li>• My Maths and grammar resources on Purple Mash are limited.</li> <li>• Some classes losing interest in Times tables rockstars.</li> <li>• Pupil fluency and resilience in using technology. Lose learning time logging in.</li> <li>• Having the right technology, Kindle screens are small and some technology is old and loses charge quickly.</li> <li>• Children are losing passwords for Teams and then not accessing home learning.</li> </ul>
Opportunities	Threats
<p data-bbox="261 1328 922 1391"><i>Where are the opportunities to use more or different technology? What are the facilitators?</i></p> <ul data-bbox="309 1420 922 2018" style="list-style-type: none"> <li>• SENDCO to buy more iPads with funding.</li> <li>• A timetable around using iPads in the morning.</li> <li>• Re-introduce battles around Times Tables Rockstars.</li> <li>• Re-launch Numbots (launched during lockdown and children didn't use it).</li> <li>• Increase the frequency of use in lessons (by knowing when they are available).</li> <li>• Using the iPads more will help pupils to become more confident in use.</li> <li>• Parent drop-in session to model to technology. Staff to demonstrate using the Ping application at parents evening.</li> <li>• Teach and model resilience using technology during lessons.</li> <li>• Share practice using technology at staff meetings.</li> <li>• Install all Applications on all iPads.</li> <li>• Sticking passwords into reading records.</li> </ul>	<p data-bbox="948 1328 1490 1361"><i>What are the barriers to using technology?</i></p> <ul data-bbox="995 1391 1474 1921" style="list-style-type: none"> <li>• Not enough technology resources in school.</li> <li>• Some resources unreliable and lose charge. Headphones don't work.</li> <li>• Difficulty sharing and organising technology resources across school.</li> <li>• Time to practice and share ideas.</li> <li>• Some iPads don't have all applications available.</li> <li>• Reading eggs limited to two users.</li> <li>• Parents/carers are not using school communication application (Ping).</li> <li>• Staff feel problems with passwords for home learning is putting parents off using technology.</li> <li>• Funding available the school can use to buy technology.</li> </ul>



## 10.17 Appendix Q Group two summary

Group Solution focused coaching two												
<p><b>Next steps agreed from previous group coaching</b></p> <ol style="list-style-type: none"> <li>1. SENDCo to apply for more iPads with funding.</li> <li>2. A timetable around using iPads in the morning.</li> <li>3. Increase the frequency the technology is used in all lessons, there is a feeling that with this increase they will become less novel and pupils will become more fluent and skilled in using them.</li> <li>4. Staff to demonstrate how to use Ping at a parents meeting.</li> <li>5. Teaching pupil's resilience during lessons.</li> <li>6. Sharing practice using technology at staff meetings.</li> </ol>			<p><b>What's changed and is working well?</b></p> <ul style="list-style-type: none"> <li>• Most iPads now have all applications teachers need.</li> <li>• 'Doodle' has replaced 'MyMaths' and more children are completing homework.</li> <li>• Teachers modelled using Ping with parents/carers and it now being used by most parents frequently.</li> <li>• Teachers are using book creator to record evidence in music lessons.</li> <li>• A teacher has started using the 'read write inc' videos to differentiate during literacy.</li> <li>• Blipit is being used to share information to subject leaders, this makes moderation easier.</li> <li>• Some teachers are using a 'team-teaching' approach to learn how to teach computing.</li> <li>• Some teachers are talking to colleagues who who feel confident and knowledgeable around a particular application of technology.</li> </ul>			<p><b>Next steps?</b></p> <ul style="list-style-type: none"> <li>• Some teachers feel 'put off' to use the technology such as, iPads because it has crashed while using and they receive an error message while using.</li> <li>• Teachers intend to continue with their individual goals when the new devices arrive.</li> <li>• A teacher is going to model using Ping with parents/carers who missed the parents evening due to Covid-19 self-isolation.</li> </ul>			<p>7 Where we were in November</p>	<p>8 Where we are now in February</p>	<p>9</p>	<p>10 The best it could be</p>
1	2	3	4	5	6	7	8	9	10			

Group 2 solution focused coaching session SWOT

Strengths	Weaknesses
<p><i>What is positive/helpful about the education technology in school? How does it influence learning?</i></p> <ul style="list-style-type: none"> <li>• Most iPads now have all applications teachers need.</li> <li>• 'Doodle' has replaced 'MyMaths' and this has helped teachers to increase the frequency technology is used for homework.</li> <li>• Ping is working well to communicate with parents.</li> <li>• Teachers are using book creator to record evidence in music lessons.</li> <li>• Some teachers are using the 'read write inc' videos to differentiate during literacy lessons.</li> <li>• Blipit is working well to share information to subject leaders, this makes moderation easier.</li> <li>• Using a 'team-teaching' approach to using technology, working with colleagues who feel confidence and knowledgeable around a particular technology or computing objective.</li> </ul>	<p><i>What is challenging about using technology? How is it not helpful?</i></p> <ul style="list-style-type: none"> <li>• Some teachers feel 'put off' to use the technology such as, iPads because it has crashed while using and they receive an error message while using.</li> </ul>
Opportunities	Threats
<p><i>Where are the opportunities to use more or different technology? What are the facilitators?</i></p> <ul style="list-style-type: none"> <li>• A class teacher is going to model using Ping with parents who missed the parents evening due to Covid-19 self-isolation.</li> </ul>	<p><i>What are the barriers to using technology?</i></p> <ul style="list-style-type: none"> <li>• New devices have not yet arrived.</li> </ul>

10.18 Appendix R Quantitative analysis descriptive statistics calculation

Self-reported knowledge data of teacher group 1 summary

<b>Teacher</b>	<b>Time point 1</b>	<b>Time point 2</b>	<b>Time point 3</b>
Hannah	5	7	6
Laura	8	9	10
Mark	6	8	7
Simon	7	8	8
Joanne	5	5	6.5
<b>Mean</b>	6.2	7.4	7.5
<b>Median</b>	6	8	7
<b>Mode</b>	5	8	n/a

Self-reported confidence data of teacher group 1 summary

<b>Teacher</b>	<b>Time point 1</b>	<b>Time point 2</b>	<b>Time point 3</b>
Hannah	5	7	6
Laura	8	9	10
Mark	6	8	7
Simon	7	8	8
Joanne	5	5	6.5
<b>Mean</b>	6.2	7.4	7.5
<b>Median</b>	6	8	7
<b>Mode</b>	5	8	n/a

Self-reported skills data of teacher group 1 summary

<b>Teacher</b>	<b>Time point 1</b>	<b>Time point 2</b>	<b>Time point 3</b>
Hannah	5	7	6
Laura	8	9	10
Mark	6	8	7
Simon	7	8	8
Joanne	5	5	6.5
<b>Mean</b>	6.2	7.4	7.5
<b>Median</b>	6	8	7
<b>Mode</b>	5	8	n/a



Self-reported knowledge data of teacher group 2 summary

<b>Teacher</b>	<b>Time point 1</b>	<b>Time point 3</b>
Jane	8	9
Katie	5	6
Sarah	5	7
<b>Mean</b>	6	7.3
<b>Median</b>	5	6
<b>Mode</b>	5	n/a

Self-reported confidence data of teacher group 2 summary

<b>Teacher</b>	<b>Time point 1</b>	<b>Time point 3</b>
Jane	9	10
Katie	4	6
Sarah	5	7
<b>Mean</b>	6	7.6
<b>Median</b>	5	6
<b>Mode</b>	n/a	n/a

Self-reported skills data of teacher group 2 summary

<b>Teacher</b>	<b>Time point 1</b>	<b>Time point 3</b>
Jane	9	10
Katie	6	6
Sarah	5	7
<b>Mean</b>	6.6	7.6
<b>Median</b>	6	6
<b>Mode</b>	n/a	n/a

## 10.19 Appendix S observations of individual coaching

EPs in the local authority placement were asked if they could observe and provide feedback on an individual coaching session. The principles below were shared with each educational psychologist prior to the observation. The coaching session took place via MS Teams, when the EP joined the call, they kept their camera and microphone off. At the beginning of the coaching session, it was explained that the EP was there to observe the 'coach' and provide feedback around their skills. A summary of the observations one is presented in the table below. This framework was taken from O'Connell, Palmer, and Williams (2012).

Table 1 observation of coaching with Simon

<b>SFC principle</b>	<b>Observer commentary</b>
Meeting context is outlined	Coach showed good use of problem-free talk and set the context for the meeting by revisiting original agenda, i.e., "Where do we want to be and steps we want to take, use of goals..." "What has changed for you since we last met?"
The coachee's concerns are acknowledged.	Good use of reflecting back and summarising, e.g., " You are thinking about children with English as an additional language"
A curious approach is taken around the coachee's strengths and skills	Use of questions such as, "What else has been working well since you last met?" and reflecting back, e.g., "So what is working well there is...."
How, when and what questions are drawn upon.	Many examples observed, e.g., "What is the most realistic first step? Have you got children in mind?" "How would you do it?" This supported 'sensing the goal' and how changes will be operationalised
The coachee is encouraged to continue what is working and gently challenge to consider doing something different if it's not working for the coachee.	This was seen through highlighting strengths and 'change talk', e.g., "You are balancing...it works well but you are aware that there are other things you can do..."

<p>Exceptions are explored</p>	<p>Exception-finding used at several points, e.g., "You are using these in the technology lessons...what is working there?" "What helps you to get the iPads into Year...?"</p>
<p>Positive feedback is given</p>	<p>"That is a big change from where we were last time..." (highlighting changes)          "This sounds amazing (offered concrete examples)"..."Those are some big goals..."</p>
<p>The coach reflects back and gently encourages the coach towards solutions</p>	<p>Use of scaling to highlight knowledge and confidence levels, e.g., "what has helped you to get to an '8'?" you mentioned in terms of next steps, a 10 would like..." "if I came into your class and saw that happening, what would I see?" "I am hearing there..." "If I came into Y... in April, I would see...." (nudging towards solutions)</p>
<p>The coach is enthusiastic and increases the coachee's awareness of their skills and strengths.</p>	<p>Coach gave positive feedback about the coachee's skills and qualities and conveyed interest and enthusiasm through affirming, highlighting changes and collaborative use of language, e.g., "It is a really big change in a short space of time". These insights/reflections were timely following concrete examples and summarising changes which have taken place since the initial meeting.</p>

Table 2 observation of coaching with Mark

<b>SFC principle</b>	<b>Observer commentary</b>
Meeting context is outlined	Coach demonstrated good use of problem free talk at the beginning which seemed to settle the client into the session.
The coachee's concerns are acknowledged.	"you in particular are using a lot in your practice"- Coach then recapped the range of technology used – this likely helped the client to feel listened to at the previous session and also begin to recognise successes.
A curious approach is taken around the coachee's strengths and skills	Coach paraphrased things that had gone well for the client and recognised strengths in overcoming challenges within his discourse, e.g. "spinning plates".
How, when and what questions are drawn upon.	In exploring "first steps", Coach encouraged him to be specific e.g. "When do computer colleagues meet?", "What time have you got?" "When would be a good time? Next week?".
The coachee is encouraged to continue what is working and gently challenge to consider doing something different if it's not working for the coachee.	Supportively challenged his place on the scale and was skilled in sensing the right moment to do this.
Exceptions are explored	
Positive feedback is given	Lots of positive talk, e.g. "exciting and creative lessons".
The coach reflects back and gently encourages the coach towards solutions	Coach identified new goals from his own reflections which required real skill in extracting these so naturally.
The coach is enthusiastic and increases the coachee's awareness of their skills and strengths.	Coach showed good active listening skills, including nodding and mirroring. She showed interest and enthusiasm through tone of voice, being specific and paraphrasing.  "How is it looking positive?" – Coach encourage the client to be more specific; this worked well in getting him to recognise why it is working. This seemed to help him as he said "I didn't realise that in the moment".

The EP observing also gave the following feedback. 'The coach asked, "What's helped you?". The client struggled with this and may have benefitted from the coach providing further scaffolding around this question'. 'The coach said "this plan has to be useful for you"; this helped client to take ownership of the plan. The product appeared realistic and manageable'.

