Teaching and Teacher Education 139 (2024) 104452

Contents lists available at ScienceDirect

Teaching and Teacher Education

journal homepage: www.elsevier.com/locate/tate

Research paper

Developing the Teacher mentoring self-efficacy scale (TMSES) using the Delphi method and exploratory factor analysis

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ARTICLE INFO

Keywords:
Scale development
Teacher mentoring
Self-efficacy beliefs
Delphi method
Exploratory factor analysis

ABSTRACT

As a psychometrically robust scale for measuring teacher mentoring self-efficacy beliefs remains to be established, the purpose of this study was to address this gap by developing the teacher mentoring self-efficacy scale (TMSES). In Phase 1 a Delphi approach ($N = 26$) determined the competencies needed for effective teacher mentoring. In Phase 2 these 44 competencies were used to generate TMSES items. Following testing with 239 teacher mentors, exploratory factor analysis suggested a 16-item two-factor model, with factors named as 'Pedagogical Practices' and 'Professional Relationships.' Results suggested strong inter-connections between qualitative themes, quantitative factors, and the theorised sources of self-efficacy.

1. Introduction

The attrition of early career teachers (ECTs) is an urgent problem facing education systems in the United Kingdom (UK) and internationally (OECD, 2021). Providing effective mentoring to ECTs has the potential to boost retention rates (Borman & Dowling, 2008; Ingersoll & Strong, 2011; Maready et al., 2021), increase self-efficacy (OECD, 2019; Renbarger & Davis, 2019), and build teaching effectiveness (Pfitzner--Eden, 2016; Ronfeldt et al., 2018). However, results from the Teaching and Learning International Survey (TALIS) in 2018, showed that only 22% of novice teachers across the Organisation for Economic Co-operation and Development (OECD) had been allocated a mentor to support and work with them through their induction period (OECD, 2019). Mentoring new teachers requires a set of mentoring competencies and the confidence to implement these skills in a range of settings (e.g., Schwille, 2008).

In 2015, as part of the 2030 Agenda for Sustainable Development, the United Nations set out 17 Sustainable Development Goals (United Nations, 2015), with goal number four being to '*substantially increase the supply of qualified teachers*' by 2030. The data collected from TALIS in 2018 indicates that, globally, there is a serious shortage of teachers. Recognising that this target may not be met should be an international call to action. One of the main factors contributing to the deficit of suitably qualified teachers is teacher attrition (OECD, 2019).

With high teacher attrition rates having deleterious consequences for students, schools, and the areas/districts they serve (Carver-Thomas & Darling-Hammond, 2019; Sorensen & Ladd, 2020), governments must start to investigate strategies for teacher retention to redress this situation. Factors that have been identified as contributing positively to teacher retention are high job satisfaction (Madigan & Kim, 2021; Toropova et al., 2021) and effective teacher preparation, including mentoring (Carver-Thomas & Darling-Hammond, 2019; Renbarger & Davis, 2019).

There is a wealth of research to suggest that mentoring is beneficial for ECTs (e.g., Hobson et al., 2016; Thomas et al., 2019), the pupils they teach (Ingersoll & Strong, 2011; Ronfeldt et al., 2018), and for mentors themselves (Lopez-Real & Kwan, 2005; Lopez-Real & Kwan, 2005; Simpson et al., 2007). However, we do not know very much about which competencies are most salient for the effective mentoring of early career teachers, nor do we know how we can assess the self-efficacy beliefs of teacher mentors with regard to executing these competencies. As such, the need for a better understanding of what effective teacher mentoring entails, and how we can best support mentors to perform this role requires further investigation. In this article, we address these research gaps through a mixed methods study that (a) explores the competencies required for effective mentoring of early career teachers, and (b) tests a new scale designed to assess teacher mentoring self-efficacy. As teacher self-efficacy beliefs have been found to be positively related to teacher effectiveness (Burić & Kim, 2020), one way of addressing teacher mentor development could be by providing teacher mentors with

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https://doi.org/10.1016/j.tate.2023.104452
Received 26 June 2023; Received in revised form 17 December 2023; Accepted 18 December 2023
Available online 3 January 2024

opportunities designed to strengthen their self-efficacy beliefs, thus maximising their effectiveness as teacher mentors. Developing a valid and reliable instrument capable of measuring teacher mentors' self-efficacy beliefs is of fundamental importance if we are to gain a deeper understanding of teacher mentoring self-efficacy (TMSE) and its impact.

2. Defining the construct

2.1. Teacher mentoring self-efficacy (TMSE)

Self-efficacy is a well-established construct, originally proposed by Albert Bandura as a key element of his '*Social Cognitive Theory*' (SCT) in 1986. It relates to the self-perception or belief one has in their ability to accomplish a specific task, or complete a course of action successfully (Bandura, 1977; 1986;1997). Many studies have demonstrated that the self-efficacy beliefs someone has can impact on their performance. For example, in Klassen and Tze's (2014) meta-analysis, using 43 studies, they found that '*teachers' self-efficacy is strongly associated with evaluated teaching performance*' and '*… modestly but significantly associated with the achievement levels of students*.' Furthermore, Burić and Kim (2020) found that teacher self-efficacy was positively related to three measures of teaching, or instructional, quality, namely '*classroom management, cognitive activation and creating a supportive climate*.' The strength of these domain specific self-efficacy beliefs can be viewed as a measure of the confidence an individual has in their ability to execute a task successfully (Bandura, 1986; Klassen & Klassen, 2018). For example, a teacher mentor with a strong sense of self-efficacy, who is confident in their ability to successfully mentor another teacher, will be more likely to achieve success than would a teacher mentor with weaker TMSE beliefs.

The efficacy beliefs we hold about ourselves are derived from four sources; namely mastery experiences, vicarious experiences, social persuasion, and affective and physiological states (Bandura, 1997). Of these, mastery experiences, or performance accomplishments, are considered to be the most influential as they are the most authentic i.e., the person is performing the action for themselves (Bandura, 1997; Usher & Pajares, 2008). For a teacher mentor, the act of successfully mentoring another teacher will provide an opportunity for them to gain mastery. However, successful outcomes are also influenced by other factors. To mentor another teacher effectively, teacher mentors also need to acquire the skills required to do this (Schwille, 2008), and the acquisition and development of these skills influences self-efficacy beliefs. For instance, if someone experiences success during skill development, their sense of efficacy is strengthened, especially if the tasks used to develop the skills are new and challenging (Bandura, 1986). These stronger efficacy beliefs, in turn, affect skill development as the individual may be more motivated to engage in activities they have previously experienced success in.

This model of reciprocal causation is part of a bigger picture of what it takes to be successful in an endeavour (Usher & Pajares, 2008). Self-efficacy is a key element in the model of triadic reciprocal causation, posited as part of SCT (Bandura, 1986). In this model, three factors are at play, each influencing each other bidirectionally. These factors are personal - such as self-efficacy beliefs; behaviour; and the environment. In a school, TMSE beliefs may well be influenced by the structures in place, such as weekly time allocated for skill development. School structures, the environment, may then be shaped and influenced by the self-efficacy beliefs and behaviours of the individuals who have accessed this development time. Alongside this, our behaviour is also influenced by how we cognitively process and interpret behavioural outcomes (Klassen & Klassen, 2018), the filters we have through which we perceive the world, and what we attribute our successes and failures to (Bandura, 1986). Self-efficacy beliefs may also have other sources, with Maddux (2009) proposing a fifth source of self-efficacy beliefs being '*imagined experience*.' He suggests that imagining ourselves as being successful in completing a task or activity that we find difficult may serve to boost self-efficacy beliefs. This cognitive self-modelling may prove to be a useful tool for strengthening TMSE as part of a training and development programme.

2.2. The need for a teacher mentoring self-efficacy scale (TMSES)

Although established and well-tested scales already exist to measure the construct of teacher self-efficacy e.g., the *Teachers' Sense of Efficacy Scale* (Tschannen-Moran & Hoy, 2001) and the *Norwegian Teacher Self-Efficacy Scale* (Skaalvik & Skaalvik, 2007), a well-defined and established scale to measure TMSE beliefs has remained elusive. A thirty-item teacher mentoring scale was created by Riggs nearly a quarter-century ago (2000). However, this scale was developed for local use, and no psychometric data on scale properties were released. Riggs (2000) consists of items that measure constructs outside of the conventional definitions of self-efficacy, i.e., outcome expectancy. As self-efficacy beliefs are not outcome expectancies (Bandura, 1997; Maddux, 2009), and the scale is split further into four predetermined skill areas that may not reflect current thinking about teacher mentoring (e.g., a new early career framework focusing on teacher mentoring was recently introduced in England (Department for Education (DfE), 2019), Riggs' scale (Riggs, 2000) does not adequately capture current conceptualisations of TMSE beliefs.

Aside from Riggs' work in 2000, very little research has been conducted on scale development with regard to the measurement of TMSE beliefs. In a study conducted by Lejonberg and Christophersen in 2015, four items to measure teacher mentor self-efficacy beliefs were constructed; however, although Lejonberg and Christophersen (2015) state that their items were adapted from those shared in a previous study unrelated to teacher mentoring (Jones, 1986), scant detail is provided as to how this was done. In addition, it is highly unlikely that this limited number of items fully reflect the breadth of the TMSE domain.

As both of these scales have significant limitations, and the authors are unaware of any other scales that have been developed to assess the self-efficacy beliefs of teacher mentors, the need for the development of a new scale is evident.

2.3. Measuring TMSE beliefs

When constructing a psychometric scale, it is important to ensure that the items created are fully representative of the construct being studied (DeVellis, 2017; Goldberg & Velicer, 2006; Nunnally, 1978). As self-efficacy beliefs are domain specific (Bandura, 1997), items must be created that reflect the domain of interest (Bandura, 2006), which in this case is teacher mentoring. The reason for this is to ensure content validity (DeVellis, 2017), an essential feature for creating an instrument capable of measuring TMSE. Therefore, to begin the task of measuring TMSE beliefs, establishing what teacher mentors need to do to be effective in their role is imperative. Alongside this, an additional consideration is that of defining and delineating what is meant by the term 'teacher mentor,' which may mean very different things, depending on the context.

There is a bewildering number of interpretations of the terms 'mentor' and 'mentoring' (Mullen, 2012). Crisp and Cruz (2009) identified over fifty different definitions for the word 'mentor' in their literature review and some definitions even come with their own caveats e.g., 'pre-service' (Ellis et al., 2020), indicating a specific role and type of mentoring that is expected to be performed. As such, there is no shared consensus or simple understanding of what these terms mean (e.g., Hobson & Maxwell, 2020), nor is there a consensus on what a competency is either (Hoffmann, 1999).

As mentoring is a human endeavour that is certainly not new, this lack of definitional clarity comes as no surprise. People have been learning from a wiser or more knowledgeable other since the dawn of our species (Ackerman et al., 2002), and as we have used these terms or notions of them for so long, their meaning, usage and our understanding

of them has evolved (Mullen, 2012; Roberts, 2000). Additionally, different countries use their own terminology for teacher mentors, such as '*cooperating teacher*' in parts of Australia (Simpson et al., 2007), and 'support *teacher*' (Feiman-Nemser, 2001), or '*supervising teacher*' in parts of the USA (Ellis et al., 2020). This adds to the complexity of establishing an accepted definition for these terms and is something we address in this paper through the use of the Delphi method (Linstone & Turoff, 1975, 2011). However, clarifying the definitions of what a 'teacher mentor' is does not lead to improved educational practice; we also need to understand the beliefs and attitudes related to successful teacher mentoring. In this regard, we have chosen to explore the self-efficacy beliefs related to teacher mentoring, which are directly related to teacher mentoring competencies.

2.4. Establishing the competencies teacher mentors need

The approach we have chosen to determine the competencies needed for teacher mentors to be effective, is the well-tested Delphi method (Linstone & Turoff, 1975, 2011). The Delphi method uses expert input to address a particular problem or research question through the means of establishing a consensus (Okoli & Pawlowski, 2004). As the goal for Phase 1 was to establish a consensus regarding the competencies teacher mentors need, the Delphi method was primarily chosen on the basis of '*fitness for purpose*' (Gorard, 2002). Another advantage was that it had been successfully used to establish the competencies needed to perform certain roles in the past e.g., Wester and Borders (2014); Neuer Colburn et al. (2016); Sakuramoto et al. (2023).

Another key advantage of the Delphi method relates to the use of expert input. Convening an expert panel is thought by many to be the most important phase of any Delphi study (e.g., Devaney & Henchion, 2018). However, what exactly confers 'expert' status is vague and imprecise (Waggoner et al., 2016), leaving it to the researcher to define what this term means for themselves (Devaney & Henchion, 2018). In terms of the current study, accessing expertise from knowledgeable others in the field of teacher mentoring is of critical importance, as this ultimately affects the credibility of the data and hence the trustworthiness of the findings (Lincoln & Guba, 1986).

As studies have demonstrated that questions or situations requiring expert judgement may be better addressed by a panel, compared to the averaging of individual responses (Okoli & Pawlowski, 2004), the Delphi method also has advantages over more traditional survey techniques. Moreover, anonymity, a key feature of this methodology (Iqbal & Pipon-Young, 2009), may lead to better representation of expert opinion (Landeta, 2006), as group members will not be able to use their position or social standing to influence others covertly, or even overtly, within the group (e.g., Hussler et al., 2011; Rowe & Wright, 2001). However, Iqbal and Pipon-Young (2009) suggest that meeting anonymously may be disadvantageous, as a lack of interpersonal interactions may lead to a lack of '*richness*' in the data produced, and result in '*less ownership*' of the responses offered.

As the Delphi method uses panellists' expertise to establish consensus over a series of surveys, the researcher's interpretations of the data are validated by the expert panel at each stage of the Delphi (Okoli & Pawlowski, 2004). In addition, as the panellists are the 'definers' in a Delphi study, previous issues raised with regard to definitions are circumvented through the mechanism of consensus.

3. Research purpose

Teacher mentoring is a critical component of successful education systems (e.g., OECD, 2019). Gaining a better understanding of how to help teacher mentors strengthen their self-efficacy beliefs will develop their practice, helping them to mentor more effectively. As the purpose of this two-phase study is to (a) define what teacher mentors need to be able to do to perform their role effectively, and (b) use these findings to develop the teacher mentoring self-efficacy scale (TMSES), we propose to address the following research questions.

RQ1. What are the skills, knowledge, attributes, and behaviours required for effective teacher mentoring?

RQ2. Is there a relationship between the skills, knowledge, attributes, and behaviours required for effective teacher mentoring?

RQ3. How are the items in the TMSES related to each other (exploring the underlying scale structure)?

RQ1 will be addressed in Phase 1 of the study using the Delphi method and reflexive thematic analysis (RTA). The findings will be used to construct a set of teacher mentoring competencies, which will be rated for importance for effective teacher mentoring by the panellists. RQ2 will be answered through the RTA conducted in Phase 1, and RQ3 will be addressed in Phase 2 of this study using exploratory factor analysis (EFA).

4. Methods

4.1. Phase 1 Delphi study

4.1.1. Panel participants

The Delphi method requires a panel of respondents who have expertise in the domain of interest (Okoli & Pawlowski, 2004). Participants, denoted by Linstone and Turoff (1975) as '*informed individuals*', selected for the expert panel in this study had a minimum of five years experience in the field of teacher mentoring. This length of experience was chosen as a cut-off as it indicates that a participant would likely have the requisite knowledge and expertise needed to contribute to the Delphi (e.g., Hsu & Sandford, 2007; Powell, 2003). Alongside this, although experts are purposively selected on the basis of their homogeneity (Okoli & Pawlowski, 2004), access to '*disparate domain knowledge*' (Rowe & Wright, 2001) is also an advantage when conducting a Delphi. For example, all panellists selected for this study were knowledgeable in the field of teacher mentoring, however, they each gained experience of this domain from a combination of different contexts and positions e.g., direct experience of mentoring; system leadership; academia; and government advisory roles. This diversity and breadth of experience is an advantage in terms of augmenting the credibility of the findings (Powell, 2003) and is highly beneficial for developing self-efficacy scales (Bandura, 2006).

Potential participants were identified in a number of ways: (a) internet searches were conducted using keyword search terms e.g., '*teacher mentoring*', '*teacher education*'; (b) publicly available lists of institutions and organisations that would have a considerable interest in the findings of the study were used e.g., universities, teaching school hubs '*school-led centres of excellence for teacher and leadership training and development*' (DfE, 2021); (c) searches for UK researchers with publications in the field; and (d) individuals already known to the researchers. Of the 74 individuals contacted, 31 accepted the invitation to take part but 5 later withdrew, leaving a final panel size of 26. Due to the international variance in understanding and usage of the terms and activities associated with '*teacher mentoring*' (Mullen, 2012), and due to the particular national focus of this study, it was decided that all panellists should be based in the UK. As all participants involved in Phase 1 of this study provided responses during the COVID-19 pandemic, it is possible that panellist responses may have been affected by this, e.g, survey fatigue (de Koning et al., 2021).

4.1.2. Panel demographics

Of the 26 panellists (age $M = 51.3$ years; $SD = 5.93$), 83.3% identified as female, 12.5% as male, and 4.2% did not disclose their gender; with the majority of panellists identifying as '*white British*' (65.4%). The panel was highly experienced in the field of teacher mentoring, $M = 16.46$ years ($SD = 7.64$), with panellists having gained experience across a broad range of contexts and often in more than one:

25.7% initial teacher education; 21.4% secondary phase (ages 11–16); 17.1% higher education; 15.7% primary phase (ages 5–11); 4.3% early years foundation stage (ages 3–7); 4.3% further education; 1.4% special schools; and 1.4% alternative provision. In addition, 29.2% held a mentoring and coaching qualification; 83.3% held qualified teacher status; and 41.7% gained experience relating to this domain from an international context. There are no hard and fast rules regarding panel size for conducting a Delphi (Hsu & Sandford, 2007; Iqbal & Pipon-Young, 2009). The factor considered to be the most important for panel composition is representativeness (Powell, 2003; Rowe & Wright, 2001). As panellists have experience of teacher mentoring across a range of contexts, reflecting the five stages of education in the UK (DfE, 2012), the representativeness of our panel is a clear strength.

4.1.3. Procedure

A small pilot study ($N = 5$) was conducted to evaluate our processes and to check the readability of the questions used in Round 1 (R1). Participants in the pilot were known to the researchers and were considered to have the expertise needed to provide meaningful feedback. Using the contributions from the pilot study, minor amendments were made to the R1 survey. The Delphi comprised three rounds of surveys, with the study taking place over a period of four months.

In R1, panellists were presented with open-ended questions designed to capture the knowledge, skills, behaviours, and attitudes required for teacher mentoring (Fig. 1). Panellist responses to the open-ended questions presented to them in R1 were subsequently analysed using an open-coding process, as part of a reflexive thematic analysis (RTA) (Braun & Clarke, 2006, 2022; Saldaña, 2016). To perform the RTA in this study, two approaches were used concurrently to analyse the data corpus. The data were coded and analysed using NVivo 12 and by using a paper-based method. The initial codes identified were used to generate categories and themes (Table 1); and for each category a competency statement was constructed. As no predetermined codebook is used for an RTA, it is to be expected that an individual researcher performing an RTA would have a different analytical outcome to another using the same data set (Braun & Clarke, 2022). As themes were not predefined and no pre-existing conceptual or theoretical frameworks were used, we recognise that we, the researchers, also bring ourselves to this data.

In Round 2 (R2), panellists were provided with an overview of the analysis from R1. They were asked to rate each competency in terms of

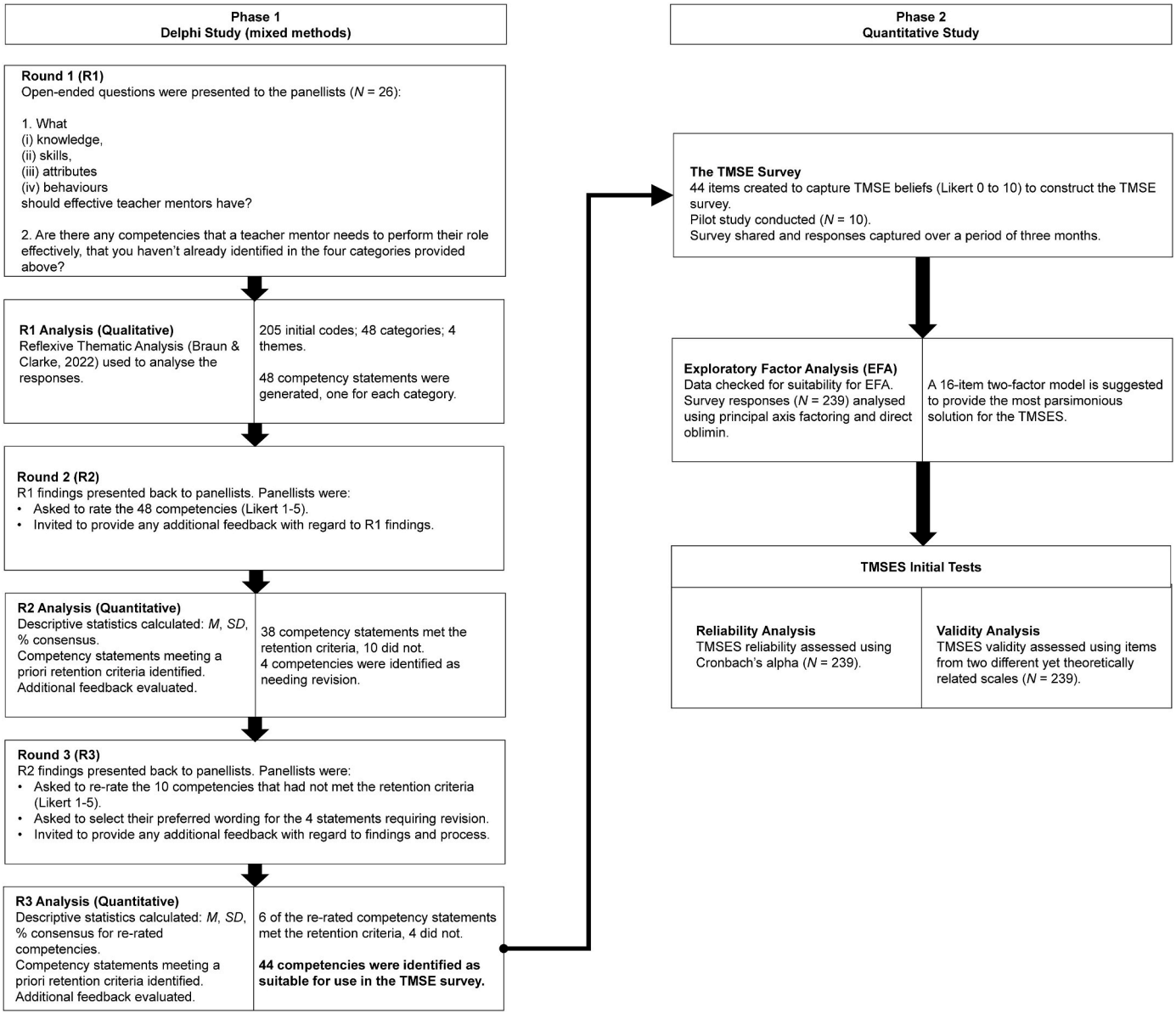

Fig. 1. An overview of the Procedures and analyses used in phase 1 and phase 2.

Table 1
Overview of themes, theme descriptors and categories generated from the reflexive thematic analysis.

Theme	Description	Categories		Shared Categories
Plan-Do-Review	Leading and facilitating the process of reflection. Based on mentee's experience, pedagogical practice, performance and expectations.	Critical reflection Problem solver *Focus on key developmental areas* Questioner Scaffolded support Andragogy Devise interventions	Facilitate dialogue Constructive challenge Build autonomy Construct learning opportunities Goal setting Constructive feedback Deconstruct practice	Assess mentee progress Programme or pathway CM Tools and Strategies Barriers to learning - mentee
Professionalism	Role modelling - explicitly and/or implicitly - the professional behaviours/skills expected and sharing knowledge about the field*. **This takes place within a specific context/setting, changing according to mentee's needs and/or place on their pathway.*	High expectations Bigger picture Advocate for profession *Teacher development* Connection builder Commitment to mentor role	Flexibility and adaptability Advocate for mentee Genuine interest School context Objectivity *IT Skills*	Assess mentee progress Programme or pathway Learner
Inter and Intrapersonal Intelligence	Building and maintaining professional and productive relationships.	Respectful and considerate Communication skills Is self-aware Relationship builder Non-judgemental	Emotional intelligence Open-mindedness Change management Empathetic	Barriers to learning - learners Barriers to learning - mentee
Teacher Practitioner	Mentor as teacher; holder of pedagogical knowledge and expertise; adviser; modeller and researcher.	Researcher-practitioner Behaviour management Expert teacher Subject knowledge	Pedagogical knowledge Modelling - pedagogical *Curriculum*	Learner CM Tools and Strategies Barriers to learning - learners

Note: Categories that have been italicised did not meet the inclusion criteria for item construction in study two.

importance for effective teacher mentoring, using a Likert scale, from 1 '*unimportant*' to 5 '*very important*.' To avoid potential researcher bias, the competencies were randomised for the rating exercise. At the end of R2, panellists were given the opportunity to provide feedback and suggest any additional competencies that may have been missing. Using responses from R2, a range of statistical tests were performed and % consensus for ratings $\geq$4 calculated. A competency was determined to be important for teacher mentoring if it achieved a $\geq$80% consensus rating of $\geq$4. This cut-off point was decided a priori. A cut-off criterion for inclusion of 80% of panellists rating the importance as 4 '*important*' or 5 '*very important*' was chosen based on the guidelines suggested by de Loe (1995), as this level of consensus in two contiguous categories indicates a '*high level of agreement*.' The mean (*M*) value for competency importance was also used, with a $M \geq 4.25$ chosen to signify that a competency failing to reach the 80% cut-off should still be considered for inclusion in the final list (Morrison & Greenhaw, 2018).

In Round 3 (R3), the analyses from R2 were shared. Panellists were asked to re-rate ten competencies that had failed to achieve group consensus (Tables 2a and 2b) and invited to provide feedback for two competencies that had received polarised responses. In addition, panellists were asked to indicate their preferred wording for four competencies that were identified as needing revision. Panellists remained anonymous to each other throughout this Delphi study to avoid more dominant group members covertly, or overtly influencing the judgements of others (Rowe & Wright, 2001).

4.2. Phase 2 quantitative study

4.2.1. The TMSES survey

The 44 competencies generated from the Delphi study (Tables 2a and 2b) were converted into items for the TMSES, using Bandura's (2006) self-efficacy scale development guidelines, and models provided from other well-tested self-efficacy scales e.g., Skaalvik and Skaalvik (2007). As such, all resultant items were designed to measure the beliefs someone holds about their capability to perform a task or activity successfully within the domain of teacher mentoring. The change from competency to item is reflected by the stem used i.e., '*An effective teacher mentor is able to …* ' precedes each competency statement, whereas '*How confident are you that you can …* ' precedes each item, with competency number directly corresponding to the item number. A Likert scale of 0 '*not confident at all*' to 10 '*highly confident*' was then applied to each item. In addition to the 44 items designed to measure TMSE beliefs, three items from the '*Teachers' Sense of Efficacy Scale (TSES)*' (Tschannen-Moran & Hoy, 2001) and three items from the '*Engaged Teachers Scale (ETS)*' (Klassen et al., 2013) were added to the end of the survey to provide checks for convergent and discriminant validity (DeVellis, 2017). As with the Delphi study, a pilot study was conducted ($N = 10$) prior to survey launch, to check for readability and ease of use. Feedback received from the testers was positive and the survey was open for three months. The survey programme Qualtrics was used to capture respondents' data securely and anonymously throughout; all survey responses were collected during the COVID-19 pandemic. As many teacher mentors completing this survey will have faced additional challenges during this time, e.g., a move to online teaching and mentoring (Howard, 2021), it is possible that participant responses may have been affected.

4.2.2. TMSES survey dissemination

Potential participants were targeted using publicly available email addresses, e.g., the 87 national teaching school hubs in England were approached and asked to disseminate the survey link to colleagues who met the suitability criteria. The survey link was also shared through social media channels. As we wanted the respondents to be representative of the teacher mentor community, the survey was open to anyone identifying as having had experience of teacher mentoring across the whole sector, e.g., schools and centres for further and higher education. Heterogeneity is recommended for scale development (Gorsuch, 1997; Yong & Pearce, 2013) as it reflects the full range of experience and beliefs of the population it will be used for (DeVellis, 2017).

4.2.3. Respondents

At the close of the survey, 239 people had completed the survey in

full, from a total of 297 respondents who had started the survey. The ages of respondents ranged from 24 to 66 years ($M = 42.4$ years, $SD = 10.44$), with 77.8 % identifying as female and 20.5 % identifying as male. All 239 participants self-identified as being experienced in the field of teacher mentoring, with 98.3% holding qualified teacher status. Years of experience ranged from less than one year (7.1% of respondents), to over twenty-five years (5.9% of respondents); $M = 9.81$ years. Experiences of teacher mentoring were varied, with 44.8% reporting experience of teacher mentoring in two or more contexts (e.g., secondary phase and higher education). Nearly all respondents completing the survey were based in the UK (99.2 %), with 72.9% identifying as white British. Only fully completed surveys were used for the exploratory factor analysis ($N = 239$), to avoid statistical issues arising from missing data (Goldberg & Velicer, 2006).

4.2.4. Exploratory factor analysis

Exploratory factor analysis (EFA) is a widely used first step for scale development (e.g., De Coninck et al., 2020) and was chosen to investigate the structure of the TMSES. All items were first checked for normality, and Bartlett's test of sphericity and a Kaiser-Mayer-Olkin (KMO) test were then conducted. As all items met the acceptable ranges and the sample size met conventional EFA guidelines (Comrey & Lee, 1992) the data was judged suitable to be analysed using EFA.

Survey responses ($N = 239$) were analysed using principal axis factoring (PAF) with direct oblimin (oblique rotation). For this study PAF was chosen as this type of factor analysis can be used to identify the latent variables underlying a construct (Tabachnick & Fidell, 2007; Yong & Pearce, 2013). IBM SPSS Statistics version 27 was used to conduct the PAF, with delta set to the default value of 0 for the factor rotation, as advised by Costello and Osborne (2005). An oblique factor rotation was chosen as it is expected that any latent factors underpinning this psychological construct will be related (Costello & Osborne, 2005). Direct oblimin was chosen as the method for the oblique rotation as it is one of the most widely used approaches and has been successfully used for self-efficacy scale development in the past e.g., De Coninck et al. (2020).

To determine the number of factors to extract, Cattell's scree test was used (Cattell, 1966) in conjunction with Kaiser's criterion (Kaiser, 1960). As advised by the literature, a number of possible factor solutions were investigated in order to establish the most parsimonious factor model (De Coninck et al., 2020; Gorsuch, 1997). For each solution, any items that did not meet the factor loading criterion for retention of ≥ 0.40 were removed from the analysis (Guadagnoli & Velicer, 1988). Likewise, any items that cross-loaded strongly onto two or more factors, with a loading ≥ 0.32 were also discarded (Costello & Osborne, 2005).

As the number of steps, and decisions required, for Phase 1 and Phase 2 are considerable, Fig. 1 has been constructed to illustrate how the two phases of this study are integrated.

5. Results

5.1. Phase 1 Delphi study

5.1.1. Reflexive thematic analysis (RTA)

From the RTA conducted after R1, 205 initial codes were generated from the data, which were grouped into 48 categories or sub-themes, comprising items that shared an underlying concept or common feature. As part of this recursive, abductive, and nonlinear analysis, four themes were generated, reflecting higher-level meanings and inferences that capture a core commonality shared by the categories within them. These four themes: '*Plan-Do-Review*', '*Teacher Practitioner*', '*Professionalism*' and '*Inter and Intrapersonal Intelligence*' provide an account of different aspects or facets of the phenomenon of teacher mentoring. Theme descriptions and their associated categories are presented in Table 1.

Six of the 48 categories or sub-themes, have elements that are common to two themes. For example, the category '*Learner*' has qualities that connect it to the themes '*Professionalism*' and '*Teacher Practitioner*.' This illustrates the interdependence and interconnectedness of the knowledge, skills, attributes and behaviours required for effective teacher mentoring; teacher mentoring can be viewed as both a role to be performed and as a process. Following the tenets of RTA (Braun & Clarke, 2022), the outputs and inferences drawn from the analysis were translated into 48 competency statements that were designed to reflect the nature or essence of each category.

5.1.2. Competency rating and consensus

The 48 competency statements were rated in terms of their importance for teacher mentoring in R2 (Tables 2a and 2b). Following the R2 analysis, 38 competencies met the inclusion criteria for item development, with eight competencies scoring 100% agreement from panellists that they are '*important*' or '*very important*' for effective teacher mentoring. After the ten competencies that failed to reach the cut-off criterion were re-rated in R3, only four competencies failed to meet the retention criteria and were therefore discarded (Tables 2a and 2b). In addition, none of the ten competencies rejected at the end of R2 achieved a mean score ≥ 4.25 for importance. Following the re-rating exercise in R3, the mean scores for eight competencies increased, and four out of the six competencies now meeting the inclusion criteria were rated $M = \geq 4.25$. It is important to note that, although competencies have been rejected, these competencies may still be valid activities for effective teacher mentoring in their own right. The aim of this exercise was to identify the most important for effective teacher mentoring, paring down the list of competencies ready for scale development (see Tables 2a and 2b).

Following the R2 analysis, two competencies were identified as receiving polarised responses using the variance of the distribution as an indicator. A variance of ≥ 1.5 was used to indicate a strongly polarised distribution (de Loe, 1995) and panellists were invited to comment on why they thought there was a difference of opinion for the competency '*Accurately and fairly assess progress using set performance criteria*' (Variance = 1.99, $M = 3.69$, SD = 1.41, % consensus $\geq 4 = 83.3$) and the competency '*Provide constructive and meaningful feedback on their mentee's progress and performance, identifying next steps*' (Variance = 1.63, $M = 4.45$, SD = 1.30, % consensus $\geq 4 = 85.0$). As both competencies relate to the assessment of a mentee's performance and progress, there appears to be some disagreement as to whether or not assessment should be part of a mentor's role. Some panellists identified that there has been a recent change in structure in mentoring arrangements, following the roll-out of a new early career framework to support the induction of early career teachers (ECTs) in England (DfE, 2023). This means that an '*induction tutor*', not the mentor, is now responsible for formally assessing an ECT. Whereas others suggested that the type of assessment to be used by mentors has relevance e.g., "*assessment against performance criteria is relevant if it is a discursive activity.*" Some panellists suggested that relational aspects should also be considered e.g., "*personal dimensions of a mentoring relationship may inhibit objective assessments being made*", with one panellist suggesting that the act of assessing brings "*a compromise to the possibility of that role.*" All of these responses suggest that although these competencies may be important, expectations with regard to the role and responsibilities expected of a teacher mentor vary widely.

Feedback from panellists in R2 also suggested that it is important the impetus for action rests with the mentee, not with the mentor. After review, competencies one, eighteen, twenty and thirty-three were identified where a change of wording to reflect this emphasis may be necessary. All suggested changes were preferred by the panellists in R3 and the final list of competencies was amended to reflect this (Tables 2a and 2b).

Table 2a
Descriptive statistics for the competencies belonging to the themes 'professionalism' and 'Inter and intrapersonal intelligence'.

	Competency description: *An effective teacher mentor is able to …*	n	% consensus ≥4	*M*	*SD*
Professionalism					
C41	Demonstrate an authentic and genuine interest in their mentee's development.	18	100.0	4.83	0.38
C27	Remain objective and fair when working with their mentee.	18	100.0	4.67	0.49
C43*	Be a strong advocate for the mentee they are supporting, demonstrating their belief in them.	18	100.0	4.22	0.43
C42	Help their mentee to navigate and understand the context of their setting.	18	94.5	4.33	0.59
C21	Demonstrate flexibility and adaptability in order to meet their mentee's needs.	18	94.4	4.44	0.62
C38	Demonstrate commitment to their role and responsibilities.	18	94.4	4.44	0.62
C7*	Facilitate access to wider expertise within their setting e.g., observing the teaching of other practitioners.	18	94.4	4.39	0.61
C10	Display high expectations for their mentee.	20	90.0	4.25	0.64
C3*	Prepare mentees for their role within the current educational landscape.	18	88.9	4.39	0.70
C26	Learn with their mentee and model what it means to be an effective learner.	18	83.4	4.39	0.78
C32	Act as a role model and advocate for the teaching profession.	18	83.3	4.22	0.73
C14*	Devise a plan for development that meets the needs of their mentee alongside the requirements of the mentee's programme/pathway.	18	83.3	4.17	0.71
C22	Accurately and fairly assess progress using set performance criteria.	18	83.3	3.89	1.41
C48	Use a range of coaching and mentoring models, tools and techniques to support the mentoring process.	18	83.3	4.17	0.86
C22	Accurately and fairly assess progress using set performance criteria.	18	83.3	3.89	1.41
*C11**	*Signpost their mentee to different development opportunities that may lead to career progression.*	*18*	*50.0*	*3.61*	*0.70*
*C36**	*Use IT to fulfil their mentoring responsibilities effectively.*	*18*	*33.3*	*3.17*	*0.79*
Inter and Intrapersonal Intelligence					
C44	Use effective interpersonal skills to build and maintain a professional relationship with their mentee.	18	100.0	4.83	0.38
C5	Behave in a respectful and considerate way towards their mentee, colleagues and learners.	20	95.0	4.60	0.75
C9	Listen actively in order to understand things from their mentee's perspective.	20	95.0	4.55	0.60
C8	Operate in an empathetic way, responding to mentee needs with kindness.	20	95.0	4.50	0.61
C34	Support their mentee in addressing their own barriers to learning.	18	94.5	4.50	0.62
C15	Demonstrate emotional intelligence in their thinking and behaviours in a mentoring relationship.	20	90.0	4.55	0.69
C17	Demonstrate self-awareness by identifying their own strengths and weaknesses as a mentor.	20	90.0	4.20	0.77
C29	Adopt a non-judgemental approach to mentee development.	18	88.9	4.44	0.70
C30	Support mentees to remove barriers to learning for learners (pupils).	18	88.9	4.44	0.70
C24	Help their mentee to respond to planned and unplanned change successfully.	18	88.9	4.33	0.84
C31	Give their mentee the freedom and space they need to grow into their role.	18	88.9	4.33	0.84

Notes: 'C' denotes competency number, competency number corresponds directly to item number in the TMSES; an asterisk denotes a competency that was re-rated in R3; italicised competencies were those that were omitted from item construction for the TMSE survey; C14, C22 and C34 also belong to the theme '*Plan-Do-Review*', and C26 and C30 also belong to the theme '*Teacher Practitioner*.'

Table 2b
Descriptive statistics for the competencies belonging to the themes 'plan-do-review' and 'teacher practitioner'.

	Competency description: *An effective teacher mentor is able to …*	n	% consensus ≥4	*M*	*SD*
Plan-Do-Review					
C35	Support and encourage their mentee to be critically reflective, identifying and exploring areas for improvement.	18	100.0	4.78	0.43
C20	Deconstruct practice with their mentee, helping them to reflect on what worked, what didn't and identify possible reasons why.	18	100.0	4.72	0.46
C39	Use a range of questioning strategies and techniques to check understanding and promote thinking.	18	100.0	4.50	0.51
C2	Challenge their mentee in a meaningful and constructive way.	20	95.0	4.65	0.59
C37*	Devise effective interventions to address their mentee's weaknesses, areas for development and growth.	18	94.5	4.61	0.61
C34	Support their mentee in addressing their own barriers to learning.	18	94.5	4.50	0.62
C40	Meet the needs of adult learners.	18	94.5	4.28	0.75
C33	Work with their mentee to help them set solution-focused, realistic, and achievable goals.	18	94.4	4.56	0.62
C19*	Facilitate and lead effective mentoring meetings that meet mentee needs and programme pathway requirements.	18	88.9	4.39	1.04
C23	Construct learning opportunities to meet the needs of their mentee, giving them the space they need to develop their practice.	18	88.9	4.39	0.70
C1	Provide constructive and meaningful feedback on their mentee's progress and performance, helping them to identify their next steps.	20	85.0	4.45	1.29
C6	Provide scaffolded support to enable their mentee to make good progress.	20	85.0	4.30	0.98
C12	Co-construct solutions to complex problems with their mentee.	20	85.0	4.25	0.97
C16	Encourage their mentee to be a self-directed learner.	20	85.0	4.15	0.99
C14*	Devise a plan for development that meets the needs of their mentee alongside the requirements of the mentee's programme/pathway.	18	83.3	4.17	0.71
C48	Use a range of coaching and mentoring models, tools, and techniques to support the mentoring process.	18	83.3	4.17	0.86
C22	Accurately and fairly assess progress using set performance criteria.	18	83.3	3.89	1.41
*C18**	*Prioritise the right areas for mentee development.*	*18*	*77.8*	*4.22*	*0.94*
Teacher Practitioner					
C46	Demonstrate the pedagogical knowledge required to provide effective guidance and support for their mentee, to help them to develop their practice.	18	100.0	4.50	0.51
C25	Provide support for their mentee to enable them to manage behaviour effectively in their setting.	18	94.4	4.44	0.62
C4	Teach effectively and have a positive impact on learning.	20	90.0	4.15	0.75
C30	Support mentees to remove barriers to learning for learners (pupils).	18	88.9	4.44	0.70
C28	Link educational theory to practice, modelling evidence informed teaching for their mentee.	18	88.9	4.17	0.79
C47	Support their mentee to develop their subject knowledge, helping them to identify and address gaps and misconceptions.	18	88.8	4.28	0.83
C13	Model effective practice including planning, teaching, and assessment.	20	85.0	4.20	0.83
C26	Learn with their mentee and model what it means to be an effective learner.	18	83.4	4.39	0.78
C48	Use a range of coaching and mentoring models, tools, and techniques to support the mentoring process.	18	83.3	4.17	0.86
*C45**	*Explain the value and importance of the curriculum in their setting.*	*18*	*61.1*	*3.89*	*1.08*

Notes: 'C' denotes competency number, competency number corresponds directly to item number in the TMSES; an asterisk denotes a competency that was re-rated in R3; italicised competencies were those that were omitted from item construction for the TMSE survey; C14, C22 and C26 also belong to the theme '*Professionalism*'; C34 also belongs to the theme '*Inter and Intrapersonal Intelligence*'; C48 also belongs to the theme '*Teacher Practitioner*'.

5.1.3. Response rates

Maximising response rates and minimising attrition is important in terms of establishing credibility and validity for Delphi studies (Gargon at al., 2019; Iqbal & Pipon-Young, 2009). The response rates achieved for each round of this study were acceptable and within the range expected for other Delphi studies with three rounds (Gargon et al., 2019). With 23 panellists contributing to R1 giving a response rate of.

88.5%, 20 panellists contributing to R2 giving a response rate of 76.9% and 18 contributing to R3 giving a response rate of 69.2%. These high response rates serve to increase the credibility and validity of the findings (Iqbal & Pipon-Young, 2009), indicating that the competencies derived from the RTA are representative of those needed to perform the role of teacher mentor effectively.

5.2. Phase 2 quantitative study

5.2.1. Exploratory factor analysis (EFA)

As Bartlett's test for sphericity was found to be significant and a KMO test achieved a score of 0.954, placing the data into the "marvellous" category (Kaiser & Rice, 1974), the TMSE survey data was considered suitable for EFA. Following these tests, the TMSES survey responses for the 44 items were then analysed using PAF. The initial solution obtained gave six factors with eigenvalues >1.0 (Kaiser, 1960), accounting for 66.08% of the total variance in the respondents' scores ($N = 239$). The results from the scree test were inconclusive, indicating that 1, 2, 3, 4 or 5 factor solutions could be possible. Each potential solution was investigated in turn to identify the most stable and parsimonious factor model, following the criteria for item retention suggested by Guadagnoli and Velicer (1988). For example, after weakly loading and strongly cross-loaded items were removed, the six-factor solution suggested by Kaiser's criterion was rejected, as two factors did not meet the minimum criteria for retention of at least three items loading '*strongly*' (loading ≥0.40) onto each factor (e.g., Child, 2006; Field, 2017). Following the same criteria, four factor and three factor solutions were then investigated. These proved to be unstable, suggesting that a two-factor extraction should be run.

At the end of this iterative EFA process, a 16-item two-factor model provided the '*cleanest*' solution i.e., factors with item loadings ≥0.40 and no cross-loading items (Costello & Osborne, 2005). The pattern matrix produced from the two-factor extraction can be seen in Table 3.

This two-factor model accounts for 61.07% of the total variance in the respondents' scores and both factors are well-defined, with each having five or more items strongly loading with values > 0.50 as recommended by Costello and Osborne (2005). The strongest-loading item for factor one (F1) was item 1 '*Provide constructive and meaningful feedback …* ', with a loading of 0.96. This competency is explicitly related to facilitating the development of mastery, through the use of effective feedback, as a type of verbal persuasion, which are powerful sources of self-efficacy beliefs (Bandura, 1997). The strongest-loading item for F2 was item 29 '*Adopt a non-judgemental approach …* ', with a loading of 0.83. Each cluster of items loading onto F1 and F2 convey a certain homogeneity, appearing to represent a different facet or dimension of the TMSE construct.

5.2.2. Reliability analysis

To assess scale reliability Cronbach's alpha (Cronbach, 1951) was used ($N = 239$). The alpha coefficient for the whole scale, containing all 16 items, was 0.94. To test the internal consistency of the subscales, alpha was then calculated for both factors: F1 $\alpha = 0.94$ and F2 $\alpha = 0.84$. As alphas of ≥0.70 are considered to indicate reliability (Field, 2017; Nunnally, 1978), the high alpha values obtained suggest that the initial scale produced from the EFA has the potential to be a reliable assessment tool for measuring TMSE beliefs.

Table 3
Pattern matrix produced from the EFA suggests a two-factor structure (N = 239).

Item	Item description	Factor	
	How confident are you that you can …	1	2
Item 1	Provide constructive and meaningful feedback on your mentee's progress and performance, helping them to identify their next steps?	.96	
Item 2	Challenge your mentee in a meaningful and constructive way?	.91	
Item 20	Deconstruct practice with your mentee, helping them to reflect on what worked, what didn't and identify possible reasons why?	.81	
Item 14	Devise a plan for development that meets the needs of your mentee, alongside the requirements of your mentee's programme/pathway?	.79	
Item 6	Provide scaffolded support to enable your mentee to make good progress?	.78	
Item 28	Link educational theory to practice, modelling evidence informed teaching for your mentee?	.69	
Item 48	Use a range of coaching and mentoring models, tools and techniques to support the mentoring process?	.69	
Item 39	Use a range of questioning strategies and techniques, when working with your mentee, to check their understanding and promote thinking?	.69	
Item 46	Demonstrate the pedagogical knowledge required to provide effective guidance and support for your mentee, in order to help them to develop their practice?	.68	
Item 47	Support your mentee to develop their subject knowledge, helping them to identify and address gaps and misconceptions?	.54	
Item 4	Teach effectively and have a positive impact on learning?	.53	
Item 29	Adopt a non-judgemental approach to mentee development?		.83
Item 44	Use effective interpersonal skills to build and maintain a professional relationship with your mentee?		.73
Item 27	Remain objective and fair when working with your mentee?		.73
Item 43	Be a strong advocate for your mentee, demonstrating your belief in them?		.58
Item 9	Listen actively in order to understand things from your mentee's perspective?		.57

Notes: Extracted using Principal Axis Factoring (PAF); rotation method used: Direct Oblimin with Kaiser Normalization; rotation converged in 4 iterations.

Table 4
Bivariate correlations between TSES and ETS items and the TMSES (N = 239).

	TSES_3 items	TMSES Factor 1	TMSES Factor 2	TMSES all items
ETS_3 items	.42**	.51**	.44**	.53**
TSES_3 items	1	.61**	.51**	.63**

Notes: **$p < .001$.

5.2.3. Validity testing using TSES and ETS

For further evidence of scale validity, three items with the strongest factor loading were selected from both the TSES (Tschannen-Moran & Hoy, 2001) and the ETS (Klassen et al., 2013). These scales were chosen as comparators as they are measuring different, yet theoretically-related constructs. The respondents' scores for these items were then compared to the item scores from the responses to the items comprising the TMSES (Table 4). The number of items used from each scale was kept to a minimum to avoid survey fatigue.

The correlations shown in Table 4 show that items from both the TSES and ETS were positively and significantly correlated to both factors of the TMSES. The results demonstrate that the TMSES has both convergent and divergent validity. For the TSES, a scale specifically designed to measure teacher self-efficacy beliefs, a stronger correlation between the two factors in the TMSES is observed ($r = 0.63$) compared to the correlations seen between the ETS items and TMSES items ($r = 0.53$). As confidence in one's ability to teach effectively may well influence a teacher mentor's belief in their capabilities to mentor another to teach effectively, this result was consistent with our expectations. The correlations are also small enough to demonstrate that the scales are measuring different constructs (Field, 2017), with smaller correlations seen between items from the ETS and TMSES factors reflecting the greater theoretical difference between these constructs compared to two scales designed to measure self-efficacy beliefs.

6. Discussion

6.1. A comparison of the analyses produced in phase 1 and phase 2

The themes generated from the RTA in Phase 1 represent different facets of the TMSE construct. Each has its own unique descriptor (see Table 1) illustrating the homogeneity of the categories associated with the theme, and the uniqueness or heterogeneity of each theme itself. The categories have been translated into items and these items have been used in the EFA to identify the underlying structure of the construct using a different analytical technique; we move from a qualitative methodology to a quantitative methodology. However, it is recognised that there is a certain '*art*' to both of these methodologies, due in part to the degrees of researcher freedom available (Braun & Clarke, 2022).

The output from the RTA contains all of the 48 categories or subthemes associated with the construct, whereas the result of the EFA (Table 3) offers up a much more parsimonious account of the underlying meaning. The EFA also provides an initial or exploratory explanation of what might be influencing or causing what can be observed. In this case, the observables are the item scores inputted by respondents in the TMSES survey, with these scores reflecting the '*unseen*' i.e., the respondents' TMSE beliefs.

Results from the EFA suggested that respondents' TMSE beliefs are influenced by two factors underpinning the TMSE construct, named as *Pedagogical Practices* (F1) and *Professional Relationships* (F2). A comparison of the analyses from the RTA and EFA was conducted to investigate if the four themes generated from the RTA are related to these two-factors, the results of which are displayed in Fig. 2.

The comparison suggests that there is a relationship between the two EFA factors and the four RTA themes. The items loading onto *Pedagogical Practices* are derived from the competencies belonging to the themes '*Teacher Practitioner*' and '*Plan-Do-Review*', with the items loading onto *Professional Relationships* derived from the competencies belonging to the themes '*Professionalism*' and '*Inter and Intrapersonal Intelligence.*' These relationships between factors and themes would be exclusive, were it not for the category '*Programme or pathway*' which belongs to two themes in the RTA. The results of the EFA have validated the output from the RTA, giving the findings from this qualitative analysis greater credibility. Additionally, the findings from the RTA serve to validate the solution suggested by the EFA.

6.2. Factors, themes and sources of self-efficacy beliefs

In Fig. 3, we explore what these factors might represent, and look towards the sources of self-efficacy beliefs as theorised by Bandura (1997). The items loading onto the first factor are associated with performance accomplishments (mastery) and vicarious experience, including the use of modelling. The items loading onto the second factor are associated with social persuasion and affective state or physiological effect. In other words, the EFA provides evidence to suggest that these factors are in some way related to the sources of the TMSE beliefs themselves (illustrated in Fig. 3). Furthermore, it is important to recognise that these sources of self-efficacy beliefs do not sit in isolation, and they can be informed by each other (Pfitzner-Eden, 2016), e.g., affective state may influence the judgements a mentor makes about their ability to successfully model a pedagogical approach, pre-, during, and post-task.

The majority of items loading onto the *Pedagogical Practices* factor

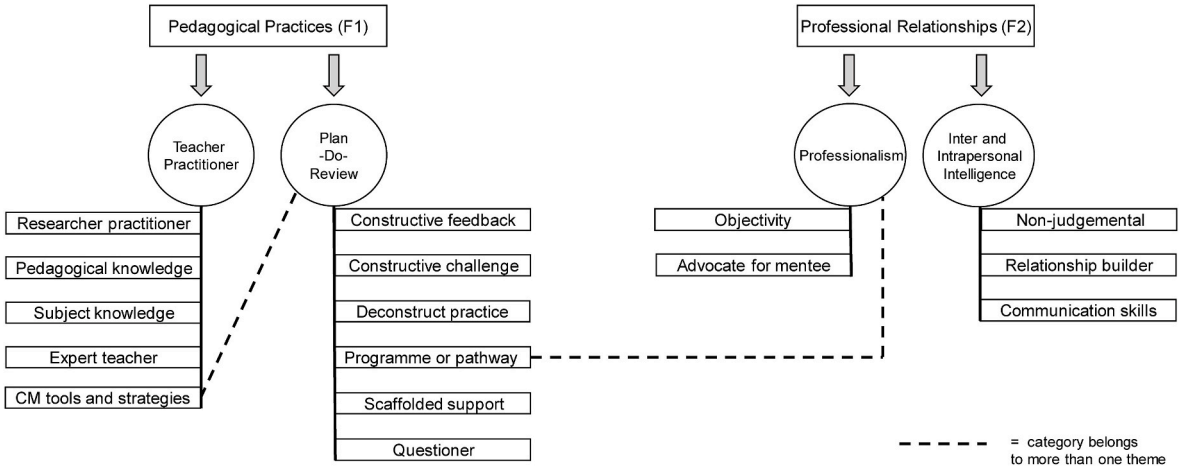

Fig. 2. A comparison of the analyses produced by the RTA and EFA

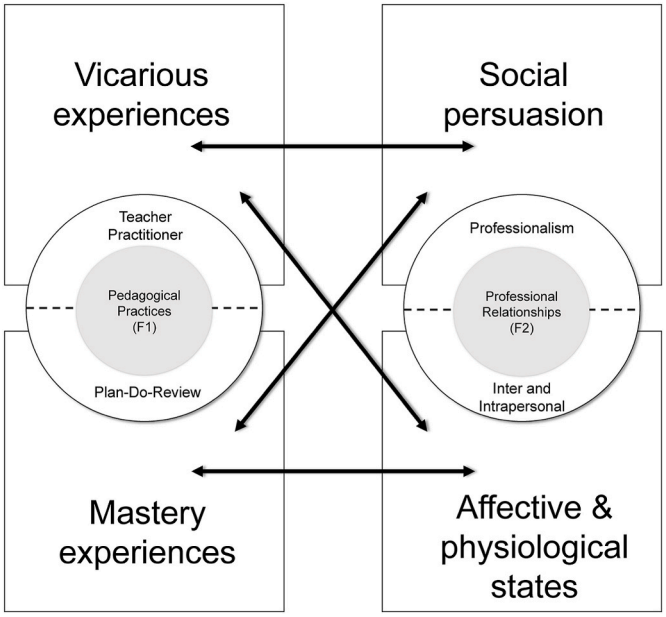

Fig. 3. Relationship between factors, themes and sources of self-efficacy beliefs.

require an understanding of what makes teaching effective, e.g., item 20 '*How confident are you that you can deconstruct practice with your mentee, helping them to reflect on what worked, what didn't and identify possible reasons why?*' (Table 3). As recent research suggests there is a positive correlation between *mentee* teaching effectiveness and *mentor* teaching effectiveness, e.g., Ronfeldt et al. (2018), Goldhaber et al. (2020), it may be that those judged to be the most effective teachers will also be more confident in their ability to mentor another teacher. However, a mentor's teaching ability or teaching effectiveness is only one part of what makes a teacher mentor effective (Schwille, 2008).

The items from the TMSE survey loading onto the *Professional Relationships* factor reflect a different quality (Table 3). They represent a set of competencies that are associated with the ability to establish and foster productive relationships within a professional environment. We can see that the items loading onto this factor are not specific to teaching and could, hypothetically, be used to measure mentoring efficacy beliefs across a range of disciplines. These items share commonality with more generalist mentoring competencies that have been previously posited, e.g., the ability to build and manage relationships (Clutterbuck, 2004).

To strengthen their self-efficacy beliefs, teacher mentors will require development opportunities for gaining mastery and vicarious experiences, alongside support and achievement-focused feedback (Bandura, 1997). This individualised feedback can then be used to better facilitate the processes of reflection and goal-setting. As the primary focus of teacher mentoring is concerned with developing the skills of the mentee (e.g., Feiman-Nemser, 2001), the learning and development needs of teacher mentors can often be overlooked. In order to provide an environment where teacher mentor learning is maximised, an understanding of how best to support this, and strengthen TMSE beliefs, is therefore required. Providing the 'right' environment for a mentor's professional development is a critical component of Bandura's triadic reciprocal causation model (1997). If we accept the premise that the setting a teacher mentor works in will influence the quality of mentor development opportunities available, this model suggests that these environmental conditions will, in turn, affect teacher mentor behaviour and TMSE. Therefore, it follows that, if teacher mentors are in an environment where they are motivated to engage in their own development, then the behaviours associated with improving their mentoring competency, e.g., acquiring mastery, are more likely to be actioned.

6.3. Teacher mentoring competencies

The Delphi was successfully used to determine a set of 44 competencies, that are judged to be important for effective teacher mentoring. It could be argued that the list of competencies generated by this study are representative of the TMSE construct, and have content validity (Goldberg & Velicer, 2006), as they have been decided and validated by panellists who have significant expertise in this field. As discussed in section 4.1.2, convening a diverse Delphi panel is highly beneficial (Hussler et al., 2011). The field-heterogeneity of this panel has resulted in a set of competencies that could, theoretically, be used to assess TMSE beliefs across a broad range of educational contexts, as they are not specific to phase or subject.

As teacher mentoring is of critical importance to ECT development (e.g., Renbarger & Davıs, 2019), it is unsurprising to discover that many studies have been conducted in this area e.g., being able to facilitate '*dialogic feedback*' was identified as a required competency by Jones et al. (2018), Hobson and Malderez (2013) posited that mentors need skills to execute '*non-judgemental*' mentoring and Nesje and Lejonberg (2022) suggested that tools such as discussion templates could be used as part of the mentoring process. All of these competencies are reflected in our own findings, e.g., C29 directly relates to adopting a non-judgemental approach and C48 refers to the need for mentors to be able to use tools to support the mentoring process (Tables 2a and 2b). However, it is important to recognise that, often, these studies tell us little about the importance of the teacher mentoring competencies that have been identified with regard to mentoring effectiveness.

To illustrate this point, a literature review of 70 peer-reviewed articles, conducted by Ellis et al. (2020) uncovered '*53 indicators*' representing the '*elements of a quality pre-service teacher mentor.*' However, some of these indicators, e.g., the use of metaphors as part of the mentoring process (Izadinia, 2017), have been extracted from small-scale studies, which tell us little about how essential this activity is for effective mentoring. The authors themselves recognise this as a limitation and have suggested additional studies, e.g., gathering data from '*experts*', be conducted to justify and verify the indicators for '*quality pre-service teacher mentoring*' they have identified. Therefore, the findings from this study could be used in subsequent studies to deepen our understanding of this domain. Furthermore, the use of the Delphi method has also contributed to our understanding of the term 'teacher mentor.' In this study, the panellists have collectively agreed and established what the role of an effective teacher mentor entails using the mechanism of consensus; as stated by Roberts (2000) '*if we do not agree on what mentoring is, how do we know if we are talking about the same thing?*' (p.163).

7. Conclusions

Teacher mentoring is an essential component of teacher induction and development (e.g., Ronfeldt et al., 2018), thereby contributing to the successful functioning of effective school systems. In this study, we have identified the most salient competencies required for effective teacher mentoring and used them to develop a psychometrically robust scale that is grounded in practice and capable of measuring TMSE. The novelty of this study is that we have integrated qualitative and quantitative methodologies to develop the TMSES. Although Delphi studies have been successfully used for psychometric scale development in the past e.g., Dragostinov et al.'s (2022) 'Propensity to Trust' scale, and for the purposes of scale/item validation e.g., Neuer Colburn et al. (2016), this method does not appear to have been used to develop a scale that is capable of measuring teacher mentoring self-efficacy beliefs. To the best of our knowledge, this is potentially the first time the Delphi method has been used to develop a scale of this nature.

7.1. Limitations of this study

It is important to recognise that our findings do have some limitations. Firstly, Phase 1 and Phase 2 of this study used participants who were based in the UK. However, as it has been shown that self-efficacy beliefs vary according to cultural settings and contexts (Vieluf et al., 2013; Zee & Koomen, 2016), it may be that the scale items would need to be tested across a range of settings to assess their validity e.g., via a cross-cultural study. Secondly, all participants taking part in this study did so during the COVID-19 pandemic, which may have influenced their responses.

Although the range of teacher mentoring competencies created from Phase 1 of this study was comprehensive, it would be wrong to say that the final list of 44 competencies is exhaustive. For example, another Delphi panel may produce different competencies, and there may be different tasks that teacher mentors are expected to perform in different countries and/or settings. For example, in Japan beginning teachers are trained by an assigned teacher mentor, and supported by colleagues in the '*shokuin shitsu*' or teacher room (Ahn, 2016), which may require a unique skill set. Additionally, as the difficulty of a competency influences self-efficacy beliefs (Bandura, 1997), it could be useful to know which competencies teacher mentors perceived to be the most difficult, both at an individual and group level. This information could be used to personalise approaches to teacher mentor development, enabling teacher mentors to spend more time gaining the skills and developing the competencies they need to perform their role effectively.

The factor analysis conducted in Phase 2 is, by its nature, exploratory. Although the items in the TMSES have loaded onto factors '*cleanly*' and '*strongly*,' it is not enough to draw any firm conclusions with regard to the verisimilitude of this model. As to be expected with a psychological construct, there is still a level of interconnectedness between the variables (Costello & Osborne, 2005; Tabachnick & Fidell, 2007). To further test the structure and validity of this hypothesised 16-item two-factor model, a confirmatory factor analysis with a new sample will be needed (Gorsuch, 1997) as a next step.

7.2. Implications for future research and suggestions for teacher mentor development

A potentially fruitful direction for future research would be to use the TMSES to further investigate the relationship between TMSE and teacher self-efficacy (TSE). Theoretically, it is possible to understand how the self-efficacy beliefs a teacher mentor holds for each of these two domains could be related to each other. For instance, it follows that if a teacher mentor is confident in their own ability to teach effectively, this will be a source of self-efficacy information used to inform their beliefs about their ability to successfully mentor another to teach effectively. We have some evidence to support the veracity of this claim via the higher correlation found between the TSES items and the '*Pedagogical Practices*' factor ($r = .61$). However, how these measures are interrelated is currently unknown. Furthermore, if there is found to be a robust reciprocal relationship between TMSE and TSE, strengthening TMSE beliefs may lead to gains in other areas e.g., pupil achievement and motivation (Zee & Koomen, 2016); and teacher enthusiasm (Lazarides et al., 2021; Moè & Katz, 2022). As teacher enthusiasm has been found to be strongly positively correlated with teacher enjoyment (e.g., Keller et al., 2016), strengthening TSE beliefs through effective mentoring practices may confer additional benefits in terms of teacher retention, e.g., a teacher who enjoys their work may be less likely to leave the profession. Investigating the relationship between TMSE, TSE and teacher enthusiasm is therefore an area worthy of future research.

How TMSE beliefs change over time may also provide insights with regard to the developmental approaches needed for inexperienced and experienced teacher mentors. If TSE beliefs are the most malleable and susceptible to change earlier in a teacher's career (Tschannen-Moran & Hoy, 2007), then the same could hold true for TMSE beliefs. As inexperienced teacher mentors will have fewer mastery experiences to draw on than experienced mentors, it may be that using different approaches for mentor development at different stages of a teacher mentor's career would be beneficial. The TMSES and the list of teacher mentoring competencies developed from the Delphi study, may be useful to teacher mentors and training providers, both as tools for personal development and for programme design.

Designing a teacher mentor development programme that focuses on strengthening TMSE beliefs would potentially confer many benefits. One key potential benefit is that of increasing teacher retention at a time of a global teacher shortage (OECD, 2019). Renbarger's and Davıs' (2019) research using TALIS (2013) data, found a positive relationship between the '*presence of a mentor*' and job satisfaction for teachers new to the profession. If mentors are able to perform their role more effectively, then we could hypothesise that this may have an even greater impact on job satisfaction for early career teachers (ECTs), and for mentors themselves (e.g., Ghosh & Reio, 2013). As higher job satisfaction is a factor that has been shown to lead to improved teacher retention (Madigan & Kim, 2021; Toropova et al., 2021), the benefit to the system in terms of increasing retention is clear.

Funding sources

Funding was provided to the second author by the ESRC Education Research Programme ES/X002144/1.

CRediT authorship contribution statement

Rebecca M. Tickell: Writing - original draft, Validation, Methodology, Investigation, Formal analysis, Conceptualization, Writing - review & editing. **Robert M. Klassen:** Writing - review & editing, Validation, Conceptualization.

Declaration of competing interest

We declare that we have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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