Vana Chiou, Lotte Geunis, Oliver Holz, Nesrin Oruç Ertürk, Justyna Ratkowska-Pasikowska, Fiona Shelton (Eds.)

RESEARCH AND EVIDENCE-BASED PERSPECTIVES IN EDUCATION

DIVERSE DISCOURSE,
CONNECTED CONVERSATIONS

Voices from the Classroom

edited by Vana Chiou, Lotte Geunis, Oliver Holz, Nesrin Oruç Ertürk, Justyna Ratkowska-Pasikowska, & Fiona Shelton

Volume 4

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Preface

In his book Narrative Power, Ken Plummer (2019: xiii)¹ asks us to consider how "we build sustainable stories to support the progress of our world and our humanities". One answer to this question is that we can do this by learning from each other, from our research, our experiences and our shared humanity. This book, therefore, goes some way to answer Plummer's question by sharing voices from different spaces and places, to create a plurality of voices to understand, solve and offer new solutions to challenges we face in education every day.

This book brings together research and evidence-based perspectives in education, sharing diverse discourses, which can lead to connected conversations to support the progress of the world, especially in relation to the different phases of education in which the different authors are working.

This is the fourth publication in the 'Voices from the Classroom' series, which examines a broad range of educational themes. The book comprises sixty chapters and is organised in four parts: Pre-school & Primary Education; Secondary Education; Higher Education; Gender, Diversity & Inclusion.

Whilst the discourses are diverse, what connects these conversations is the interest and curiosity in education. After all, the authors are teachers, researchers, professors, and students each with their own investment in different educational contexts and how they are experienced and can be enhanced. Their inquiry into educational challenges presents opportunities to learn from their questions and solutions, to try out new approaches and to remain open minded about the possibilities that exist in improving educational practices, policy and outcomes.

The chapter authors remind us of the complexity of education. That one size does not fit all and that solutions to challenges need to be evidence informed and carefully considered. We should also be cognisant that what works in one context, country or classroom might not work in other contexts and that we need to stay curious to find our own solutions, but with the insight of others to guide us. We can also glean ideas from different contexts, whilst the book is organised in different phases of education, the chapters are discrete, and solutions focussed. We believe there is learning that can applied taking a cross-phase approach.

The book does not need to be read in a linear fashion, there is not one place to start and another where it finishes. Rather it is a collection of educational stories, and we advise you to start with a chapter that interests you, that is close to your own phase of education or where the subject matter intrigues or challenges your thinking.

¹ Plummer, K. (2029). Narrative Power. Cambridge: Polity Press.

In our book the stories are values-based, social, political and educational. They highlight contemporary issues of our time and are grounded in research and evidence-based practice. We hope you find it accessible and interesting and, returning to the beginning of this preface, that it goes someway to answer Plummer's question (Plummer, 2019) on how we can build sustainable stories to support the progress of our world and our humanities.

Vana Chiou (Greece), Lotte Geunis (Belgium), Oliver Holz (Belgium), Nesrin Oruç Ertürk (Turkey), Justyna Ratkowska-Pasikowska (Poland) & Fiona Shelton (United Kingdom)

Elisabeth Desiana Mayasari & Khofidotur Rofiah

Influencing Factors on Teacher Candidates' Attitudes Towards Scientific Research

A Review to Measure Phenomena in University Education

Abstract

Teachers' attitudes towards scientific research are essential for effective, evidence-based teaching. This scoping literature review examines peer-reviewed articles from 2018 to 2023 to analyze teacher candidates' attitudes toward scientific research. The current study aims are (1) summarizing global study trends on teacher candidates' attitudes towards scientific research and (2) finding the influencing factors of teacher candidates' attitudes towards scientific research. Twenty-six studies met the inclusion criteria for this scoping review. This scoping review examined 26 articles on teacher candidates' attitudes toward scientific research, classifying the influencing factors into three categories: (1) educational, (2) psychological, and (3) social. Educational factors such as learning styles, teaching styles, experiences, and grade levels influence teacher candidates' attitudes toward scientific research. Furthermore, psychological factors such as motivation, self-efficacy, and anxiety significantly shape teacher candidates' attitudes toward scientific research. Moreover, social factors, including family support and community context, are important when enhancing teacher candidates' attitudes toward scientific research.

Keywords: teacher candidates, scientific research attitudes, influencing factors, scoping review, university education

Introduction

Scientific research collects and analyses data with a clear objective, carried out through structured and systematic methods (Mcmillan & Schumacher, 2010). This approach ensures the research is purposeful and methodical, laying the foundation for accurate and reliable findings. Research forms the foundation of scientific progress (Marczyk et al., 2005). To generate knowledge, an individual must possess the ability to think scientifically. In today's society, scientific thinking and critical thinking are considered keys to citizens' primary and comprehensive education and among the main objectives of science education (García-Carmona, 2023).

Developing a positive attitude towards scientific research among teacher candidates is essential for cultivating a research-oriented mindset, which is increasingly recognized as a vital component of effective teaching. Studies have shown that teacher candidates with strong research skills are better equipped to integrate theory with

practice, critically reflect on their teaching methodologies, and contribute to advancing educational knowledge (Şahan & Tarhan, 2015; Kirkwood & Christie, 2006).

Teachers who engage in research are thought to gain several advantages in their educational practice, as summarized by van der Linden et al. (2012). Such teachers tend to become more critical and reflective of their teaching methods, essential for their professional development and the enhancement of their competencies (Larrivee, 2000). Furthermore, by conducting research, teachers can translate scientific and educational research results into improvements in their practice (Elliott, 2004; Gore & Gitlin, 2004).

Based on these benefits, teachers will be confident in deciding their teaching methods and practices and keep themselves updated with cutting-edge educational practices worldwide through research. Examining their knowledge and skills by doing action research is also beneficial. However, there still needs to be more literature reviews focusing on teachers' attitudes towards scientific research.

Within this context, examining published studies' literature and investigating educational correlations associated with teacher candidate attitudes towards scientific research become crucial. This study systematically identifies and analyzes the educational factors influencing teacher candidates' attitudes toward scientific research through scoping reviews. This study performs an extensive scoping literature review on teacher candidates' attitudes toward scientific research, covering publications from 2018 to 2023. The review aims to analyze research trends and identify prominent aspects of teacher candidates' attitudes towards scientific research in various databases. Furthermore, this review explores the various educational factors shaping teacher candidates' attitudes toward scientific research.

Based on the research aims, the research questions leading this scoping review are as follows: What are the overall research trends about teachers' attitudes towards scientific research that have been addressed by previous researchers in the publications Scopus, JSTOR, ERIC, PubMed, Frontiers in Education, and Web of Science (WoS) databases between 2018 to 2023?

Method

This study employed a scoping review method to identify key concepts, primary sources, and relevant research data related to specific topics. A scoping review is deemed suitable for this study due to its systematic approach to identifying and analyzing educational correlates that impact teacher candidates' attitudes toward scientific research. This methodology effectively addresses knowledge gaps and encompasses measurements from diverse contexts, enhancing the study's comprehensiveness. The methods regarding the scoping review is based on the framework presented by Arksey and O'Malley (2005) and also recommended by (Levac et al. (2010). This method follows five phases: 1) identifying the research question, (2) identifying relevant studies, (3) study selection, (4) charting the data, and (5) collating, summarizing, and reporting the results.

This study used specific inclusion criteria: a) empirical studies examining educational factors related to teacher candidates' attitudes toward scientific research, b) research focused on teacher candidates as participants, and c) studies addressing factors related to research attitudes within courses associated with the research domain. To ensure thoroughness, studies were included regardless of their publication year.

The author used the data-charting form from Levac et al. (2010), designed to extract the data for scoping reviews of quantitative studies. A descriptive review approach was employed for each study, encompassing various aspects such as publication year, study objectives and research questions, study design, participant age, outcomes, results, key findings, and limitations. Supplementary elements were also evaluated, including the educational factors influencing scientific research attitudes, the range of research methods employed, and the contextual backdrop of each study. Following data extraction, the authors engaged in discussions to ascertain the congruence of the obtained information with the research question. In the study selection, the author looked back at the title's relevance to the article found. The author examined the articles' relevance to deciding on inclusion. It is worth noting that the author remained aware of the authorship details during this process.

Sample

The manuscripts cover the publication period from 2018 to 2023. The published studies were sourced from academic databases, including Scopus, JSTOR, ERIC, PubMed, Frontiers in Education, and Web of Science. Articles were selected according to specific inclusion criteria established by the authors to address the research question:

- published in English
- published in the peer-reviewed scientific journal
- published between January 2018 and December 2023
- focused on the teacher candidates' attitudes towards scientific research
- focused on university students
- empirical research (quantitative, qualitative, and mixed methods)
- focused on educational, psychological, and social influencing factors

Screening and data collection

The full text of each article was acquired, although restricted articles were excluded. These criteria were essential for ensuring a thorough research process. Using these criteria, articles were systematically searched and selected. The following syntax sample was applicable in the Scopus database: (TITLE-ABS-KEY (factors) AND TITLE-ABS-KEY (teacher AND candidates') OR TITLE-ABS-KEY (student AND teacher) AND TITLE-ABS-KEY (attitude) AND TITLE-ABS-KEY (scientificAND research)) AND PUBYEAR > 2018 AND PUBYEAR < 2023 AND (LIMIT-TO (LANGUAGE, "English!")) AND (LIMIT-TO (SUBJAREA, "soci") OR LIMIT-TO (SUBJAREA, "psyc")) AND(LIMIT-TO (DOCTYPE, "ar"))

A total of 1,135 articles were collected from six databases and downloaded in RIS. The literature screen exported articles to the Rayyan web application, a free webbased and mobile application designed to streamline the initial screening of abstracts

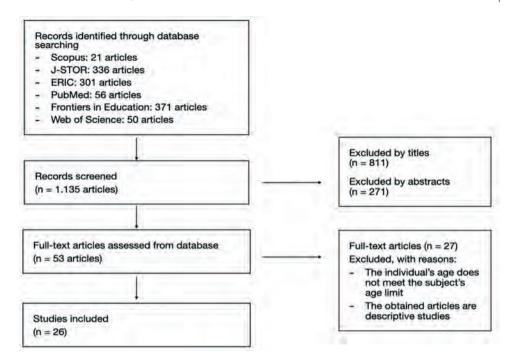


Figure 1. Flowchart of study selection

and titles (Ouzzani et al., 2016). Two review authors independently examined the titles of 1.135 publications to ensure they met the inclusion criteria. The keywords factors were teacher candidates, student teachers, attitude, and scientific research. The Boolean operators were AND and OR. The subject area was limited to education, social sciences, and psychology; English was used.

Procedure

A total of 27 articles were excluded from the analysis because these excluded articles were primarily descriptive and did not furnish relevant information regarding the educational correlates linked to attitudes towards scientific research among teacher candidates.

Results

Researchers divide the findings into several factors. The first factor is educational factors, including learning styles, where a learning process directly and significantly correlates with the attitude towards scientific research (Barja-Ore et al., 2022; Çelik & Ergin, 2022). Moreover, fostering student interest during the learning journey proves essential (Bilasa & Taṣpınar, 2019), alongside cultivating habits of mind, meta-cognition, and scientific literacy (Gürler, 2022). Furthermore, teaching styles, where there is

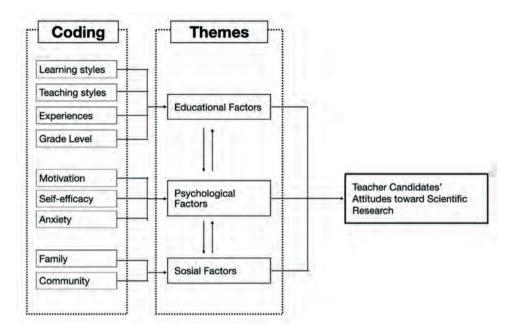


Figure 2. Relationship between codes and themes in the scoping review

a direct and significant teaching process that correlates with attitude toward scientific research (Barja-Ore et al., 2022; Irwanto, 2022; Hernandez et al., 2022; Kizilhan & Demir, 2022; Lee & Glass, 2019; Long, 2019), the attitude raised and the type of instruction students receive (Diaz, 2019), and positive teacher behaviors (Agir, 2019). In addition, experience also influences the attitude towards scientific research teacher candidates, as indicated by the teaching practice experienced by students (Tasdemir et al., 2020;Sarikaya & Sökmen, 2022; Murathan, 2019; Akcanca, 2020; Diery et al., 2020). Additionally, exposure to others' research outputs (Olivares-Donoso & Gonzalez, 2018) and research valuation within and outside school settings (Diaz, 2019; Bilasa & Taṣpınar, 2019) contribute to shaping attitudes. Grade level also emerges as a contributing factor (Çelik & Ergin, 2022), affecting attitudes among teacher candidates towards scientific research.

The second is the psychological factor, which includes intrinsic motivation (Gök & Kabasakal, 2019) and the belief in the importance of scientific research (Bilasa & Taṣpınar, 2019). Furthermore, self-efficacy is also a significant factor, encompassing self-confidence, a willingness to develop critical thinking (Bilasa & Taṣpınar, 2019; Olivares-Donoso & Gonzalez, 2018), and enhanced problem-solving skills (Ames-Guerrero et al., 2022). Additionally, anxiety has emerged as another factor influencing teacher candidates' attitudes towards scientific research (Kolesnikova et al., 2020; Arslan, 2023; Gredig & Bartelsen-Raemy, 2018).

The third factor encompasses social components, notably community elements such as the influence of external perceptions (Saracoglu & Kahyaoğlu, 2021), prevailing learning culture (Sever et al., 2019), and the impact of social media (Diaz, 2019). Moreover, within the family context, family support is pivotal for scientific

engagement (Diaz, 2019). Furthermore, age (Gredig & Bartelsen-Raemy, 2018) and gender ;Özcan, 2020) Çelik & Ergin, 2022; Gredig & Bartelsen-Raemy, 2018) also emerged as influential factors.

Discussion

Research trends about teachers' attitudes toward scientific research

In line with the review's objectives of identifying key concepts and primary sources, the researcher determined that psychological, educational, and social factors are significant determinants of teacher candidates' attitudes toward scientific research. These three factors are also related to teachers' professional development (PD), including (1) educational factors that highlight pedagogy and professional competencies teachers should have, including knowledge and skills to manage teaching and students and mastering the subject they teach, (2) psychological factors highlighting with personality/emotional competence which pertains teachers ability to exhibit stable and high motivated person, and (3) social factors connected with social competences highlighting proficiency in teachers' communication and interpersonal skills not only in the classroom with students but also in the communities. The previous study (Korthagen, 2017) suggested that teachers' needs, focus, prospects, emotions, motivations, and dreams should be considered when designing the PD process for teachers in the present scoping review.

Factors on teacher candidates' attitudes towards scientific research

The influencing factors identified in this scoping review include educational factors, such as learning styles, teaching styles, experience and grade level. These educational aspects significantly influence future teachers' attitudes towards scientific research, as evidenced by various studies. The previous study (Ilhan, 2021) supports this notion by showing that integrating evidence-based practices in science teaching enhances student teachers' attitudes toward educational research. Thus, incorporating evidence-based practices in teaching can foster a more positive outlook on research.

The psychological factors that emerged in this review include motivation, self-efficacy, and anxiety, all of which influence teacher candidates' attitudes towards scientific research. Ch. et al. (2021) found that while teacher candidates often experience discomfort and uncertainty about scientific research, they also find satisfaction. This suggests that improving motivational strategies could positively influence their attitudes towards research. Self-efficacy stands out as another crucial element; for example, the attitudes of pre-service teachers towards scientific research positively mediate the relationship between their critical thinking skills and information literacy, indicating that increased self-efficacy in these domains could promote more favorable research outlooks (Bozoğlu & Yavuz, 2023).

The social factors influencing teacher candidates' perspectives on scientific research encompass familial background, age, gender, and community. It aligns with research conducted by Bozoğlu and Yavuz (2023), which emphasizes the significant role of gender as the influencing factor of future educators' attitudes towards scientific research.

The relationship between teacher candidates' attitudes toward scientific research and educational factors

Based on scoping review analysis, the relationship between teacher candidates' attitudes towards scientific research and educational factors focuses on several key elements: 1) Learning Styles. Studies show a correlation between learning styles and attitudes towards scientific research. Barja-Ore et al. (2022) and Çelik and Ergin (2022) stated that a more active and engaged learning process fosters positive attitudes toward scientific research. 2) Teaching Styles. The approach to instruction and teaching style significantly affects attitudes toward research. Interactive and evidence-based teaching methods are particularly effective in cultivating positive attitudes toward scientific research (Barja-Ore et al., 2022; Hernandez et al., 2022; Long, 2019). 3) Experience and Exposure. Experience in teaching practice and exposure to research findings during teacher training play a crucial role in shaping attitudes. Teacher candidates actively participating in research activities during their training are more likely to develop a positive perspective on scientific research (Tasdemir et al., 2020; Olivares-Donoso & Gonzalez, 2018). 4) Grade Level. The academic level at which candidates engage with research also plays a role. Those at higher educational levels often exhibit more positive attitudes towards scientific research, possibly due to increased exposure and experience (Çelik & Ergin, 2022).

The relationship between teacher candidates' attitudes towards scientific research and psychological factors

The scoping review analysis explores the relationship between teacher candidates' attitudes toward scientific research and psychological factors, specifically examining the roles of motivation, self-efficacy, and anxiety. Both intrinsic and extrinsic motivation are critical; the motivated candidates who mainly find personal relevance in research are more likely to develop positive attitudes toward scientific research (Gök & Kabasakal, 2019; Bilasa & Taşpınar, 2019). Self-efficacy also plays a crucial role; confidence in one's ability to conduct and understand research is positively associated with favourable attitudes toward scientific research. Teacher candidates with higher self-efficacy are also more likely to engage in research activities (Olivares-Donoso & Gonzalez, 2018; Ames-Guerrero et al., 2022). Additionally, research-related anxiety can negatively affect attitudes toward scientific research. However, research suggests

that increasing self-efficacy may help mitigate this anxiety, thereby improving positive attitudes towards research (Kolesnikova et al., 2020; Arslan, 2023).

The relationship between teacher candidates' attitudes towards scientific research and social factors

The scoping review analysis examines the relationship between teacher candidates' attitudes towards scientific research and social factors, focusing on the influence of family and community. (Diaz, 2019) stated that support from family to engage in research activities is linked to more positive attitudes towards scientific research. Furthermore, the broader community and educational environment, including the type of school (public vs. private) and community support, can significantly shape attitudes. Victoria (2023) added that private school environments are often associated with more positive attitudes towards research.

Additionally, gender and age impact attitudes, with younger individuals and females sometimes showing less favorable attitudes toward research (Özcan, 2020; Gredig & Bartelsen-Raemy, 2018). Older students can be said to have a more positive attitude towards science than younger ones. Another study by Yilmaz & Timur (2012) also found that students of higher ages have more positive attitudes towards science.

Teacher candidates' participation in research is also meaningful. Engaging in research activities, often facilitated by mentors or integrated into the curriculum, can positively affect their attitudes toward research. This involvement helps them appreciate the value of research and fosters a more positive outlook (Nguyen et al., 2023).

Practical recommendations for universities

Universities can play a key role in shaping teacher candidates' attitudes toward scientific research by making a few strategic changes. First, integrating evidence-based practices into science teaching curricula can help students see the value of research in real-world education. Offering courses focusing on scientific literacy and understanding research literature can encourage positive attitudes toward research. It's important to use teaching strategies that tap into students' intrinsic motivation and highlight the role of research in improving education. Programs that build confidence in critical thinking and information literacy skills can further support this positive mindset. Hands-on research opportunities and exposure to research projects within and outside academic settings give students practical experience and a broader perspective. Creating a supportive environment that addresses research anxiety is another key step, as is using a variety of teaching styles to meet different learning needs. Finally, mentorship programs connecting students with experienced researchers provide guidance, inspiration, and a clearer understanding of scientific research.

Reflection on the significance of methodology for future research

The methodology used in this scoping review has valuable lessons for future research. The review systematically identified key concepts and studies from multiple sources by taking a comprehensive approach, creating a strong foundation for others to build on. It also pointed out gaps in the existing research, showing where more work is needed. It is an important step in steering future studies. How the review grouped factors influencing attitudes (educational, psychological, and social) gives researchers a useful framework to dive deeper into these areas or explore how they interact. Explicit inclusion and exclusion criteria ensured the review stayed focused and relevant, which is something future studies can adopt to maintain quality. The review captured various perspectives by pulling data from multiple sources, showing the importance of casting a broad net in research. Focusing on studies from 2018 to 2023 allowed for insights into recent trends, but this timeframe could be expanded in future research to track changes over a more extended period. Finally, using mixed methods, such as quantitative, qualitative, and blended, shows the potential for gaining deeper, more nuanced insights, something future studies can build on to better understand teacher candidates' attitudes toward research.

Conclusion

This scoping review of articles on teacher candidates' attitudes toward scientific research classifies the influencing factors into three categories: (1) educational, (2) psychological, and (3) social. Positive teachers' attitudes toward scientific research directly impact the successful implementation of teaching practices. It is important to consider these influencing factors to foster teacher candidates' positive attitudes towards scientific research. This scoping review contributes to the growing literature on teachers' attitudes towards scientific research. The policy maker, higher institutional education, and teachers association should ensure that the comprehensive development program supports positive attitudes towards scientific research and the factors that influence it.

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