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Review article

# Non-university-based teacher educators' professional learning: A systematic review

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ABSTRACT

This systematic review synthesizes 51 empirical studies on non-university-based teacher educators' (NUBTEs) professional learning published between 2000 and 2022. The results show that NUBTEs strive to develop a host of professional qualities that enable them to support preservice and in-service teachers' growth through formal and informal learning experiences. The reviewed studies are predominantly qualitative research and have produced context-specific knowledge about NUBTEs' professional learning, but cross-contextual and large-scale empirical evidence is currently scarce. These findings suggest theoretical, practical, and methodological implications for advancing the research field of teacher educators' professional learning.

## 1. Introduction

Teacher educators are vital professionals who work closely with teachers, and they can significantly impact teachers' work performance, professional learning, and career development (Loughran & Menter, 2019). In general, teacher educators are those "who teach or coach (student) teachers with the aim of supporting their professional development" (Lunenberg et al., 2014, p. 5). They engage in various professional practices to support teachers' growth, such as modeling effective teaching, providing feedback on teachers' performance, and publicly advocating for the teaching profession (Association of Teacher Educators, 2018).

In theory, teacher educators need purposeful, specialized, and sustained professional learning to become capable of teaching teachers (Liao et al., 2021; Loughran, 2014). However, in reality, many teacher educators are left to learn on their own, ironically similar to the "sink or swim" learning model for teachers that many teacher education programs have abandoned. The self-reliant, self-changing, self-formation situation of learning has posed challenges to teacher educators, such as difficulty in developing professional identities as teacher educators, fragmented professional knowledge about and for teacher education, and a lack of practical strategies and tools for working with teachers (Biesta et al., 2022).

In recent years, growing attention has been given to teacher educators' professional learning in policy, practice, and research. Many countries, such as the United States, the United Kingdom, Australia, and China, have placed teacher educators' professional learning and development on their latest education reform agendas (Ministry of Education of China, 2022; Russell et al., 2020; United Kingdom Government, 2016; S. White et al., 2018). Meanwhile, various university degree programs, professional development (PD) courses, and institutional partnerships have been formulated to improve the teacher educator workforce.

Accordingly, studies on teacher educators also emerged as a distinct research field in the early 2000s (Ping et al., 2018). After two decades of accumulation of studies, this research field has become sizeable and qualitatively diverse. Several review studies (e.g., Erdin, 2021; Goller & Rieckmann, 2022; Gondwe, 2021; Izadinia, 2014; McEvoy et al., 2015; Ping et al., 2018; Saito, 2013) have been conducted to synthesize the literature on teacher educators with different foci. Some of them are focused on teacher educators' work experiences, such as teacher educators' challenges at workplaces (Saito, 2013), perceptions of education for sustainable development (Goller & Rieckmann, 2022), and identity construction in and through professional practices (Izadinia, 2014). Some others (e.g., Erdin, 2021; McEvoy et al., 2015) have examined studies on teacher educators in specific subject contexts. For instance, McEvoy et al. (2015) critically synthesized 96 papers on physical

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education teacher educators based in higher education institutions, which produced a sketch of physical education teacher educators' professional socialization, knowledge development, and collaboration with relevant stakeholders. Still others (e.g., Gondwe, 2021; Ping et al., 2018) have reviewed previous studies on the professional learning and development of teacher educators based in higher education contexts. For instance, Ping et al. (2018) undertook a systematic overview of 75 studies on teacher educators' professional learning, focusing on what (content), how (activity), and why (reason for professional learning) they learn during their work. The reviews conducted by Ping et al. (2018) and others have deepened and systematized our understanding of university-based teacher educators' (UBTEs) work, challenges, learning, and growth. However, as Ping et al. (2018) acknowledged, "… we focused only on university-based teacher educators. An overview of school-based teacher educators' professional learning would be valuable since they play a pivotal role in mentoring student teachers" (p. 102).

As an active response to Ping et al.'s (2018) call, we began to survey the research literature on the professional learning of teacher educators outside of universities who provide essential guidance and support to preservice and in-service teachers. We coined an umbrella term—non-university-based teacher educators (NUBTEs)—to refer to such a group of teacher educators, using UBTEs as a reference. Informed by the relevant literature (e.g., Andreasen, 2023; Russell et al., 2020; Zhang & Yuan, 2019), we define NUBTEs as a group of teacher educators who are based in non-university settings (e.g., K-12 schools, education administration agencies, social institutions) and use a variety of practice-oriented approaches (e.g., mentoring, coaching, workshops) to guide preservice teachers' transition from universities to schools and support in-service teachers' continuing professional growth at work. NUBTEs are a large and diverse group encompassing several main subgroups, including cooperating teachers, mentor teachers, instructional coaches, and others (e.g., associate teachers, teacher trainers/PD providers).

As summarized in Table 1, each main subgroup presents several features. Cooperating teachers are experienced teachers who help preservice teachers transition from "students of teaching" to "teachers of students." Mentor teachers are the teachers who have rich experience and outstanding performance in teaching, and they may provide professional guidance and support to both preservice and in-service teachers (mainly beginning teachers) (Ganser, 2002). Both cooperating teachers and mentor teachers are mainly based in K-12 schools, and thus, some scholars (e.g., Bullough, 2005) also call them school-based teacher educators. School-based teacher educators such as cooperating teachers and mentor teachers often take the dual roles of "teacher of K-12 students" (first-order teaching) and "teacher of K-12 teachers" (second-order teaching) simultaneously. In other words, they take on the responsibility of teacher educators while teaching their own classrooms in K-12 schools (Dille, 2022; Salo et al., 2019; Uibu et al., 2017; S. White, 2019; E. White et al., 2015). In their second-order teaching, school-based teacher educators mainly use one-on-one mentoring to provide timely, on-site, and individualized guidance to preservice and beginning teachers as the teachers strive to transition from universities to K-12 schools.

**Table 1**
Sub-groups of non-university-based teacher educators and their characteristics.

| | | Institutional base | Phase of teacher education | Practice of teacher education |
|---|---|---|---|---|
| 1 | Cooperating teacher | School | Preservice | Mainly one-on-one mentoring |
| 2 | Mentor teacher | School | Preservice and in-service | Mainly one-on-one mentoring |
| 3 | Instructional coach | School, education administration agency | In-service | One-on-one or group coaching |
| 4 | Others (e.g., associate teacher, teacher trainer) | School, education administration agency, social institution | Preservice and in-service | One-on-one or group mentoring/ coaching, coteaching, workshop, lecture |

The third main subgroup of NUBTEs is instructional coaches based in K-12 schools or education administration agencies (e.g., district-level school boards). Instructional coaches mainly focus on helping in-service teachers improve their teaching performance through one-on-one or group coaching. Both mentoring and coaching are commonly used interventions in teacher education, but they differ in several important aspects. While mentoring is concerned with learning for professional growth, takes a medium-to long-term perspective, and involves advice-giving and mindset conditioning, coaching is more concerned with learning for performance, takes a short- to medium-term perspective, and involves one primarily aiding another in task-specific improvements through reflective inquiries and guided instructions for the benefit of the one being coached (Ng, 2005; Yariv, 2009).

In addition to the above three, there are a few other subgroups of NUBTEs, such as associate teachers (e.g., Palazzolo et al., 2019), hybrid teacher educators (Burns & Badiali, 2020), and teacher trainers (e.g., Monnier et al., 2023). Depending on specific contexts, these NUBTEs could be based at a variety of non-university sites and support both preservice and in-service teachers' professional development through a variety of teacher education practices, such as one-on-one or group mentoring/coaching, coteaching, and workshops.

The large, diverse, and growing workforce of NUBTEs plays increasingly crucial roles in teacher education, especially when many countries are now shifting their teacher education sites closer to schools to alleviate the chronic theory-practice gap experienced by many teachers prepared by traditional, university-based teacher education programs (Andreasen, 2023; Hagger et al., 2013). However, to the best of our knowledge, no study has systematically reviewed the dynamic and growing body of literature on NUBTEs, which has limited the understanding of and practice related to NUBTEs' professional learning and development. To close this research gap, we systematically reviewed 51 empirical studies on NUBTEs published between 2000 and 2022. Three research questions guided our review: 1) What do NUBTEs learn? (i.e., contents of professional learning); 2) How do NUBTEs learn? (i.e., approaches to professional learning); and 3) What research methodologies have been used to study NUBTEs' professional learning and what are their strengths and limitations? This review identifies the main contents and approaches of NUBTEs' professional learning, generates new insights into the practices for advancing NUBTEs' professional learning, and outlines needed and promising lines of inquiry for future studies.

## 2. Methodology

### 2.1. Forming the pool of literature

We formed the pool of literature for review following the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) procedures (Page et al., 2021) (see Fig. 1).

In the identification phase, we searched for relevant literature in four databases widely used in educational research, including ERIC, Google Scholar, Scopus, and Web of Science. Informed by previous studies on the type, meaning, and naming of teacher educators and professional learning (Bullough, 2005; Lunenberg et al., 2014; Taylor, 2020), we used "teacher educator" (or its synonyms, namely, "mentor," "teacher trainer," "cooperating teacher," and "instructional coach") and "professional learning" (or its synonyms, namely, "professional development," "professional growth," and "professional change") as two search terms in the title, abstract, and keywords, attempting to make the search as comprehensive as possible. As a result, we identified a total of 6096 records. Please refer to the supplementary file for details about the

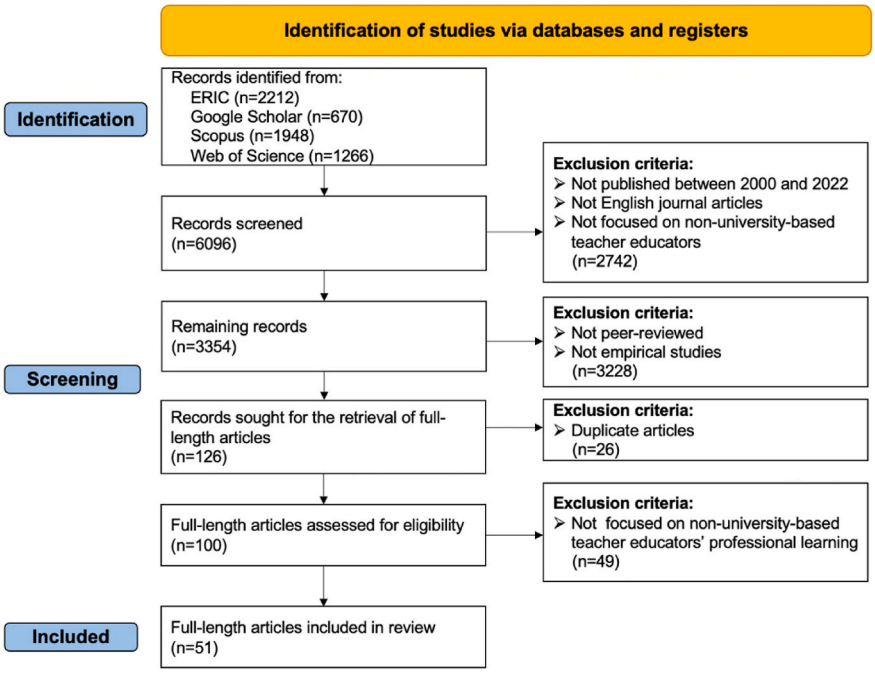


**Fig. 1.** PRISMA flow chart.

search process.

Then, we reduced the pool through four rounds of screening. The first round excluded 2742 records that were not published between 2000 (i.e., when the studies on teacher educators emerged as a distinctive research field; Ping et al., 2018) and 2022, not English journal articles, or not focused on non-university-based teacher educators. In the second round, we excluded 3228 records that were not peer-reviewed or empirical studies. In the third round, we retrieved full-length articles from the remaining 126 records, read the articles, and excluded 26 duplicates. In the fourth round of screening, we perused the remaining 100 articles and excluded 49 articles that were not focused on NUBTEs' professional learning. As a result, 51 articles were included in this review. Table 2 lists the selected articles and their basic information in alphabetical order by the authors.

Our method of forming the pool of literature might have excluded journal articles that did not include NUBTEs' professional learning in their titles, abstracts, or keywords but were, in essence, focused on the topic of this review. We did not include works of scholarship in other forms (e.g., dissertations, books). Moreover, we only searched English databases, which resulted in the exclusion of non-English texts. Similar to the challenges reported in previous reviews (e.g., Li & Sang, 2022; Liao et al., 2022), our decisions to include or exclude the articles were inevitably subjective. Thus, we acknowledge that the reviewed studies are by no means exhaustive. We call for future studies to broaden their search scopes, capitalize on more advanced technologies, procedures, and methods, and strengthen the collaboration between researchers from different countries to address these limitations.

### 2.2. *Overviewing the research contexts of the reviewed articles*

As displayed in Table 3, the reviewed articles reported studies on NUBTEs' professional learning in different research contexts. In terms of national context, nearly half of the studies (n = 24) were from the United States. Furthermore, our pool of literature included two or more studies from Australia (n = 5), Canada (n = 4), the United Kingdom (n = 3), Israel (n = 3), and China (n = 2). We also included one study each from Estonia, Germany, Ireland, Netherlands, Norway, Sweden, and Turkey. Three studies (i.e., Lu et al., 2016; Stoetzel & Shedrow, 2020; Tschannen-Moran & Carter, 2016) involved multiple nations. It is worth noting that many studies selected for review in this study are from the United States, which may have rendered other countries under- or non-represented in the research findings. More studies from under- or non-represented contexts are needed to deepen and enrich our understanding of NUBTEs' professional learning in different national and sociocultural contexts.

Furthermore, nine of the reviewed studies focused on cooperating teachers, 33 studies on mentor teaches, seven studies on instructional coaches, and two studies on other subgroups of NUBTEs. In terms of the subject context, 27 studies disclosed such information, while the other 24 did not. Among the 27 studies, seven were conducted in the subject of mathematics, five in science, two in physical education, and one each in elementary education, literacy education, and special education. Ten articles examined NUBTEs' professional learning in multiple subject contexts (e.g., STEM—Science, Technology, Engineering, and Mathematics). Regarding the phase of teacher education, the majority of the reviewed articles (n = 33) examined NUBTEs' professional learning in the context of initial teacher preparation, and 16 studies examined the context of in-service teacher development. One study (i.e., Melton et al., 2019) involved both, and another (i.e., Fletcher et al., 2018) did not disclose such information.

Concerning the level of teacher education—the grade level that the teachers were prepared or supported by NUBTEs to teach, 13 articles focused on the elementary level, 11 on the secondary level, 18 on both, and nine did not disclose such information. The distributions of research contexts showed that the pool of literature covered studies on NUBTEs' professional learning in diverse contexts, including some that had received limited attention in previous reviews; this enabled us to synthesize empirical evidence from underrepresented nations, subjects, and teacher education settings to comprehensivize and deepen our understanding of NUBTEs' professional learning.

### 2.3. *Extracting, analyzing, and synthesizing the core information*

We treated the empirical evidence in the selected articles as raw data and analyzed them in three steps. First, we extracted the core information relevant to the three research questions from the reviewed articles

**Table 2**
Basic information for the 51 articles selected for review.

| ID | Author | Year | National context |
|---|---|---|---|
| 1 | Ambrosetti | 2014 | Australia |
| 2 | Arnold | 2002 | United States |
| 3 | Athanases et al. | 2008 | United States |
| 4 | Belton et al. | 2010 | Ireland |
| 5 | Betlem et al. | 2018 | Australia |
| 6 | Beutel et al. | 2017 | Australia |
| 7 | Burns & Badiali | 2020 | United States |
| 8 | Carmi & Tamir | 2021 | Israel |
| 9 | Carroll | 2005 | United States |
| 10 | Cheng & Yeung | 2010 | China - Hong Kong |
| 11 | Childre & Van Rie | 2015 | United States |
| 12 | Chu | 2019 | United States |
| 13 | Daly & Milton | 2017 | England |
| 14 | Dever et al. | 2003 | United States |
| 15 | Dille | 2022 | Norway |
| 16 | Elyashiv & Levi-Keren | 2022 | Israel |
| 17 | Erbilgin | 2014 | Turkey |
| 18 | Fletcher et al. | 2018 | Canada |
| 19 | Fransson | 2016 | Sweden |
| 20 | Gallo-Fox & Scantlebury | 2016 | United States |
| 21 | Gilles & Wilson | 2004 | United States |
| 22 | Grimmett et al. | 2018 | Australia |
| 23 | Guenther & Wexler | 2021 | United States |
| 24 | Gunckel & Wood | 2015 | United States |
| 25 | Karathanos-Aguilar et al. | 2022 | United States |
| 26 | Koballa et al. | 2010 | United States |
| 27 | Kuzle & Biehler | 2015 | Germany |
| 28 | Land | 2018 | United States |
| 29 | Landt | 2004 | United States |
| 30 | Leshem | 2014 | Israel |
| 31 | Liu et al. | 2015 | China - Taiwan |
| 32 | Lu et al. | 2016 | China, Australia, New Zealand, Canada |
| 33 | Lyons et al. | 2017 | United States |
| 34 | McAleer & Bangert | 2011 | United States |
| 35 | Melton et al. | 2019 | United States |
| 36 | Nielsen et al. | 2010 | Canada |
| 37 | Nilsson & Van Driel | 2010 | Canada |
| 38 | Palazzolo et al. | 2019 | Canada |
| 39 | Perry & Boodt | 2019 | United Kingdom |
| 40 | Pylman | 2016 | United States |
| 41 | Russell et al. | 2020 | United States |
| 42 | Salo et al. | 2019 | Estonia |
| 43 | Smith & Nadelson | 2016 | United States |
| 44 | Stein et al. | 2022 | United States |
| 45 | Stoetzel & Shedrow | 2020 | United States, Colombia, Brazil |
| 46 | Tschannen-Moran & Carter | 2016 | United States, India, Malaysia |
| 47 | Tunney & van Es | 2016 | United States |
| 48 | Veenman et al. | 2001 | The Netherlands |
| 49 | Voelkel et al. | 2021 | United States |
| 50 | E. White et al. | 2015 | United Kingdom |
| 51 | S. White | 2019 | Australia |

and stored it in a Microsoft Excel spreadsheet. This step resulted in three raw datasets focused on NUBTEs' learning content, approach, and research methodology.

Second, we used a combination of inductive and deductive analysis to categorize the extracted information into themes and subthemes about NUBTEs' professional learning. For the first two research questions about NUBTEs' professional learning content and approach, we used existing studies on UBTEs' professional learning (e.g., Loughran, 2014; Ping et al., 2018) as a reference to categorize the extracted empirical evidence into several general themes. A host of subthemes emerged from this step, capturing the unique features and nuances in NUBTEs' professional learning. For instance, in their review of UBTEs' professional learning, Ping et al. (2018) summarized the content of UBTEs' professional learning into four general themes: "professional identity," "knowledge base," "pedagogy of teacher education," and "research and reflection" (p. 97). We used these general themes as a general frame and explored subthemes that could reflect the particular

**Table 3**
Research contexts of the reviewed articles (N = 51).

| National context | Type of NUBTE | Subject area | Phase of teacher education | Level of teacher education |
|---|---|---|---|---|
| United States (24)<br>Australia (5)<br>Canada (4)<br>United Kingdom (3)<br>Israel (3)<br>China (2)<br>Estonia (1)<br>Germany (1)<br>Ireland (1)<br>Netherlands (1)<br>Norway (1)<br>Sweden (1)<br>Turkey (1)<br>Multiple nations (3) | Cooperating teacher (9)<br>Mentor teacher (33)<br>Instructional coach (7)<br>Others (2) | Mathematics (7)<br>Science (5)<br>Physical education (2)<br>Elementary education (1)<br>Literacy (1)<br>Special education (1)<br>Multiple subjects (10)<br>Not specified (24) | Initial teacher preparation (33)<br>In-service PD (16)<br>Mixed (1)<br>Not specified (1) | Elementary (13)<br>Secondary (junior & senior) (11)<br>Mixed (18)<br>Not specified (9) |

*Note*. 1. The numbers in the brackets are the counts of studies in the corresponding categories; 2. To present the key information succinctly, we do not include the article IDs for each category. The full version of the table with article IDs can be obtained upon request.

and special characteristics of NUBTEs' professional learning. We renamed "professional identity" as "disposition"—a more general, inclusive term for teacher educators' dispositional qualities such as professional motivation, identity, and confidence (e.g., Hallett, 2010; Liao & Maddamsetti, 2019).

To address the third research question about research methodology, we drew on the taxonomy widely used in educational research (e.g., Lather, 2006; Maxcy, 2003; Mertler, 2021) and coded the research methodology into one of the following four categories: quantitative, qualitative, mixed-methods (quantitative and qualitative), and action-oriented. The quantitative approach is undergirded by positivism, positing that knowledge is objective and that large-scale, long--range quantitative methods should be used to discover "the truth." In contrast, the qualitative approach is informed by interpretivism, which believes that knowledge is co-constructed and that there are many truths about the same phenomenon. The mixed-methods approach is influenced by pragmatism, which is used to attempt to reconcile the tension between the dramatically opposed epistemological viewpoints of both quantitative and qualitative approaches, take advantage of both of them, and achieve a richer experience through productive combination of quantitative and qualitative approaches (Maxcy, 2003). The action-oriented approach takes the standpoint of critical theories, positing that knowledge is inseparable from social practices and that action-oriented research should aim to improve the social conditions for stakeholders in and through actions rather than discover "the truth" that applies everywhere or understand one of "many truths" in contexts (Lather, 2006; Mertler, 2021).

Finally, we counted the number of studies falling into the coded groups. The structure and the distributions of the 51 articles among the themes constituted a critical depiction of the current knowledge base of NUBTEs' professional learning. We also pinpointed typical studies to showcase the identified features of NUBTEs' professional learning, and we elaborated on them in detail in the "Review results" section below. Throughout the research process, the four authors engaged in ongoing discussions regarding literature selection and analysis, reached agreements on the review findings, and strived to increase the reliability and trustworthiness of this study.

## 3. Review results

Guided by the three research questions, we found that 1) NUBTEs' professional learning was mainly focused on a host of professional dispositions, knowledge, practices, and inquiry skills (their meanings and distinctions will be further explained in the following sections) entailed in working professionally as teacher educators; 2) NUBTEs' professional learning took place through a variety of formal and informal approaches; and 3) quantitative, qualitative, mixed-methods and action-oriented research approaches were adopted to study NUBTEs' professional learning, with the qualitative approach being the dominant choice among the reviewed studies.

### 3.1. Contents of NUBTEs' professional learning

As summarized in Table 4, we identified five categories of content for NUBTEs' professional learning, including disposition, knowledge, practice, inquiry skill, and other relevant qualities. The first three categories (i.e., disposition, knowledge, and practice) align with the mainstream construct of a social professional's quality in occupational psychology research and are emphasized in the literature on teacher educators (Kraiger et al., 1993; Liao et al., 2021). In particular, dispositions refer to NUBTEs' intrinsic qualities related to their professional work as teacher educators that cannot be directly observed by others (Korthagen, 2004), such as the mission and motivation for, beliefs about, confidence in, and self-constructed identity of being a teacher educator. Knowledge means NUBTEs' structured and stabilized understanding of teaching and teacher education. Practices are the behaviors, actions, and performances that NUBTEs enact to fulfill their duties as teacher educators. The fourth category—inquiry skills—highlights the thinking and research skills that NUBTEs need to enquire into and improve their teacher education practices, as what Schon (1983) calls "reflective practitioners" (p. 300). Apart from the four categories above, the reviewed studies also mentioned several other professional qualities that NUBTEs attempted to improve, such as leadership and collaboration. We combined these miscellaneous qualities into the fifth category—Others—to indicate an inclusive, open-ended, and dynamic set of emerging content in the current studies on NUBTEs' professional learning.

**Table 4**
The contents of NUBTEs' professional learning (N = 51).

| Dimension | Content | Count | Article ID |
|---|---|---|---|
| Disposition | First-order disposition | **3** | |
| | • *Confidence as a teacher* | 1 | 22 |
| | • *Motivation to become a better teacher* | 2 | 29, 42 |
| | Second-order disposition | **26** | |
| | • *Awareness of the role of teacher educator* | 13 | 1, 2, 5, 12, 13, 20, 21, 22, 26, 29, 42, 46, 50 |
| | • *Confidence in assuming the role of a teacher educator* | 13 | 4, 11, 12, 16, 18, 19, 21, 23, 39, 45, 47, 50, 51 |
| | • *Self-constructed identity as a teacher educator* | 5 | 6, 12, 15, 22, 49 |
| Knowledge | First-order knowledge | **16** | |
| | • *Content knowledge* | 5 | 3, 27, 32, 37, 50 |
| | • *General pedagogical knowledge* | 6 | 8, 17, 20, 25, 37, 43 |
| | • *Instructional knowledge* | 1 | 37 |
| | • *Pedagogical content knowledge* | 5 | 4, 17, 27, 34, 35 |
| | • *Knowledge of students* | 1 | 37 |
| | • *Knowledge of educational contexts* | 1 | 21 |
| | • *Knowledge of integrating technology into teaching* | 1 | 31 |
| | Second-order knowledge | **16** | |
| | • *Knowledge of the role of a teacher educator* | 8 | 4, 5, 6, 18 19, 26, 38, 50 |
| | • *Knowledge of teacher education pedagogies* | 8 | 1, 4, 5, 17, 21, 26, 27, 40 |
| | • *Knowledge of teacher learners* | 3 | 9, 27, 42 |
| | • *Knowledge of teacher education contexts* | 3 | 19, 21, 39 |
| Practice | First-order practice | **12** | |
| | • *Classroom teaching practices* | 12 | 3, 8, 12, 20, 22, 25, 29, 31, 37, 42, 43, 51 |
| | Second-order practice | **31** | |
| | • *General teacher education approaches* | 16 | 1, 3, 4, 5, 6, 9, 15, 17, 19, 26, 30, 35, 39, 48, 50, 51 |
| | • *Specific teacher education skills* | 15 | 11, 14, 23, 24, 27, 28, 33, 38, 40, 41, 44, 45, 46, 47, 49 |
| Inquiry skills | Critical thinking skills | **3** | 6, 25, 28 |
| | Reflective thinking skills | **11** | 6, 7, 20, 25, 34, 37, 38, 43, 48, 50, 51 |
| | Action research skills | **1** | 10 |
| Others | e.g., leadership, collaboration, curriculum development | **12** | 3, 10, 15, 19, 20, 21, 25, 26, 28, 29, 36, 48 |

*Notes*: 1. The bolded numbers are the counts of the studies in the corresponding categories after deducting the duplicate articles; 2. Many studies have reported multiple types of learning contents. Thus, the sum of the bolded numbers is greater than 51.

Most NUBTEs work simultaneously as teachers and teacher educators. Their teaching in the roles of K-12 teachers and teacher educators are called first-order teaching and second-order teaching, respectively. While the two orders of teaching are tightly interconnected, they also require NUBTEs to possess different competencies. Our analysis identified a series of dispositions, knowledge, and practices that empower NUBTEs to conduct first- and second-order teaching, and we called these two layers of competencies first-order and second-order qualities (Murray & Male, 2005; Ping et al., 2018; S. White, 2019). The first- and second-order qualities within the fourth and fifth categories did not emerge from our analysis, suggesting that inquiry skills and other relevant qualities were cross-cutting ones that might apply to both layers of teaching. In what follows, we elaborate on the five categories of NUBTEs' professional learning content and their corresponding subcategories.

#### 3.1.1. Disposition

Three articles explored NUBTEs' professional learning around the first-order dispositional qualities, including confidence in teaching (Grimmett et al., 2018) and the motivation to become better teachers (Landt, 2004; Salo et al., 2019). For instance, in Grimmett et al.'s (2018) study, some participating mentor teachers enhanced their confidence as K-12 teachers due to their involvement in collaborative partnerships with UBTEs. The study of Landt (2004) showed that by observing student teachers' teaching practices, mentor teachers gained opportunities to reflect on their teaching practices and strengthened their motivation to become better teachers to improve their teaching practices.

Twenty-six studies examined the improvement of second-order dispositions directly related to NUBTEs' work as teacher educators. These included awareness of the role of teacher educators, confidence in assuming the role of teacher educators, and self-constructed identities as teacher educators. As Stryker and Burke (2000) clarified, a role is external and linked to positions within social structures. In contrast, identity is internal and focused on inner dynamics, internalized meanings and expectations. Thus, the first second-order disposition of NUBTEs, as we identified in 13 articles (e.g., Ambrosetti, 2014; Arnold, 2002), was their awareness of the socially constructed and expected role of teacher educators situated in an extensive education system. Going beyond awareness, 13 other articles (e.g., Childre & Van Rie, 2015; Elyashiv & Levi-Keren, 2022; Guenther & Wexler, 2021; Tunney & van Es, 2016) investigated the participating NUBTEs' confidence in fulfilling the duties ascribed by the role of teacher educators. The third second-order dispositional quality, reported in five studies (e.g., Chu, 2019; Grimmett et al., 2018), was about NUBTEs' self-constructed

identities as teacher educators, which reflected their personalized interpretations, beliefs, and positionings about the role of teacher educators. For instance, Chu's (2019) study found that the participating NUBTEs constructed a variety of identity markers, such as "coach," "role model," "colleague," "friend," and "sister," to describe their personalized understanding of and engagement with their role as mentor teachers.

In sum, the dispositional qualities reported above constituted a description of NUBTEs' professional learning content ranging from their awareness of and motivation for first-order teaching to those of second-order teaching and from sensing the socially constructed role of teacher educators to constructing their personal identities as teacher educators.

### 3.1.2. Knowledge

Many studies have investigated various categories of knowledge entailed in working as teacher educators. In particular, 16 studies focused on seven first-order knowledge categories needed for teaching K-12 students. They were similar to those listed in Shulman's (1987) taxonomy of teacher knowledge, including content knowledge (e.g., Athanases et al., 2008; Kuzle & Biehler, 2015; Lu et al., 2016), general pedagogical knowledge (e.g., Karathanos-Aguilar & Ervin-Kassab, 2022; Smith & Nadelson, 2016), instructional knowledge (e.g., Nilsson & van Driel, 2010), pedagogical content knowledge (e.g., Belton et al., 2010; McAleer & Bangert, 2011), knowledge of students (Nilsson & van Driel, 2010), and knowledge of educational contexts (Gilles & Wilson, 2004). For instance, Nilsson and van Driel (2010) explored the joint learning of a group of primary science student teachers and their mentors through joint teaching. The results showed that the participating mentor teachers developed various categories of knowledge, such as science content knowledge, knowledge of students, and general pedagogical knowledge. In addition to the knowledge categories specified in Shulman's taxonomy of teacher knowledge, Liu et al. (2015) examined how a collaborative PD experience enhanced the participating mentor teachers' and preservice mentee teachers' knowledge of integrating technology into teaching.

Sixteen studies examined the development of NUBTEs' professional knowledge directly and explicitly related to second-order teaching (i.e., teaching teachers). Four categories of second-order knowledge emerged from our analysis of the reviewed articles, including knowledge of the role of a teacher educator (Belton et al., 2010; Fletcher et al., 2018), knowledge of teacher education pedagogies (Ambrosetti, 2014; Koballa et al., 2010), knowledge of teacher learners (e.g., Salo et al., 2019), and knowledge of teacher education contexts (Fransson, 2016; Perry & Boodt, 2019). The knowledge of the role of a teacher educator refers to NUBTEs' overall understanding of their professional duties and responsibilities associated with this role (Belton et al., 2010). Relatedly, the three other categories of knowledge focus on NUBTEs' understanding of three indispensable components: the methods, learners, and context of teacher education practices. Furthermore, the three categories of knowledge also corresponded to three first-order types of knowledge, including general pedagogical knowledge, knowledge of students, and knowledge of educational contexts. Such a link between knowledge at the two levels of teaching implied the interconnectedness of NUBTEs' professional knowledge. However, knowledge corresponding to a few other categories of first-order knowledge, such as content knowledge, pedagogical content knowledge, and knowledge of technology integration, was not placed as the content of NUBTEs' professional learning in second-order teaching (i.e., teaching teachers). Because of the different knowledge structures for first- and second-order teaching, there is a call for more studies on the contents, structure, and features of the professional knowledge NUBTEs need to acquire for teaching teachers.

### 3.1.3. Practice

Similar to disposition and knowledge, a series of first- and second-order practices were posited as NUBTEs' professional learning content in many of the reviewed studies. In particular, 12 studies (e.g., Carmi & Tamir, 2021; Grimmett et al., 2018; Salo et al., 2019) focused on NUBTEs' learning and development of first-order practices—the teaching practices in K-12 classroom settings. These studies explored how working with and supervising teacher-learners helped NUBTEs expand and renew their teaching practices in ways that benefited students. Assuming the role of teacher educators requires NUBTEs to reflect on their practices (Grimmett et al., 2018), recognize which practices to improve (Karathanos-Aguilar & Ervin-Kassab, 2022), and stretch out of their comfort zone to experiment with new practices (Carmi & Tamir, 2021).

Many other studies (n = 31) examined NUBTEs' learning about second-order practices that were more directly and closely related to the teaching of teachers. Some studies (e.g., Ambrosetti, 2014; Betlem et al., 2018; Carroll, 2005; Erbilgin, 2014; Leshem, 2014; Perry & Boodt, 2019) examined the training of NUBTEs to engage with general teacher education approaches that usually consisted of a set of ideas, procedures, strategies, and tools for teaching teachers. For instance, Beutel et al. (2017) studied how a mentor preparation program titled "Mentoring Beginning Teachers (MBT)" trained participating NUBTEs to adopt a need-based teacher education approach and master a series of strategies for mentoring beginning teachers, including identifying mentee teachers' learning needs, crafting mentoring plans based on identified needs, and enacting need-based mentoring plans and evaluating their influences in collaboration with mentee teachers.

Instead of focusing on general teacher education approaches, several other studies (n = 15) explored how to improve specific teacher education skills that NUBTEs would use in teaching teachers (e.g., Gunckel & Wood, 2015; Land, 2018; Pylman, 2016; Voelkel et al., 2021). For instance, Dever et al.'s (2003) study focused on NUBTEs' skills in giving educative feedback to teacher learners. Kuzle and Biehler (2015) investigated NUBTEs' skills in teaching data analysis. Lyons et al. (2017) examined NUBTEs' skills in conducting motivational interviews to enhance teacher learners' motivation and self-efficacy for change.

In short, the reviewed studies reported that NUBTEs engaged with various general teacher education approaches and specific teacher education skills to improve their second-order practices as teacher educators.

### 3.1.4. Inquiry skills

Similar to Ping et al.'s (2018) study on UBTEs' professional learning, inquiry skills emerged as a standalone category of NUBTEs' professional learning content, which stressed the crucial role of enquiring into teacher education practices in facilitating NUBTEs' work performance and professional growth. Fifteen reviewed studies focused on several inquiry skills NUBTEs needed to navigate the inevitable uncertainties, dynamics, and complexities in teacher education. These included the skills to think critically (Karathanos-Aguilar & Ervin-Kassab, 2022) and reflectively (Beutel et al., 2017; McAleer & Bangert, 2011) and taking research-informed actions (Cheng & Yeung, 2010). For instance, some studies (e.g., Beutel et al., 2017; McAleer & Bangert, 2011) identified that reflective thinking skills enabled NUBTEs to experiment with innovative practices, expand their professional roles, and stretch into new arenas. NUBTEs were expected to become "deeper reflector" (Burns & Badiali, 2020, p. 196), not only reflecting deeply on their own practices (E. White et al., 2015) but also reflecting on the practices of teacher learners to deepen their understanding of these teachers and better support the professional growth of teacher learners (Nilsson & van Driel, 2010).

In short, inquiry skills emerged as a distinct category of NUBTEs' professional learning content because they could enable NUBTEs to continuously critique, reflect on, research, reform, and improve their practices as teacher educators.

### 3.1.5. Others

The fifth category included several other qualities identified as

NUBTEs' professional learning content that did not fit into the above four categories. These included leadership skills (Cheng & Yeung, 2010; Gallo-Fox & Scantlebury, 2016), establishing participant collaboration (Koballa et al., 2010), listening attentively (Tschannen-Moran & Carter, 2016), empathizing with others (Veenman et al., 2001), professional autonomy (Athanases et al., 2008), and several others. Some of these qualities (e.g., empathizing with others) were not exclusively linked to NUBTEs' professional roles and practices as teacher educators. However, they were foundational qualities that any educator or human being should possess. Some other qualities (e.g., leadership) pointed to possible directions for NUBTEs' career development within the education system. Still others (e.g., professional autonomy) manifested a focal area widely pursued by those in the teaching and teacher education profession. In sum, the fifth category of learning content suggests that an expansive, diverse, and emergent set of qualities that NUBTEs are expected to possess is taking shape and has been cultivated in several contexts.

Until now, we have reported five categories of qualities as NUBTEs' professional learning content in the reviewed studies. Then, the next research question is how the NUBTEs learned about these competencies. In what follows, we delve into greater detail about the approaches NUBTEs took to engage in their professional learning.

### 3.2. Approaches to NUBTEs' professional learning

As presented in Table 5, NUBTEs attempted to learn through both formal and informal approaches. The formal approaches were characterized by well-defined goals and plans, including organized PD programs and workshops, learning communities, university courses, and certification programs. In contrast, NUBTEs engaged in informal learning through both traditional and transformative mentoring practices, where the learning activities for NUBTEs were more spontaneous, unstructured, and unplanned.

#### 3.2.1. NUBTEs' formal learning approaches

A large number of studies (n = 34) focused on NUBTEs' professional learning in a series of intentionally and formally configured programs, activities, and partnerships for advancing their professional growth.

**Table 5**
The approaches to NUBTEs' professional learning (N = 51).

| Form | Approach | Count | Article ID |
|---|---|---|---|
| Formal learning | PD programs and workshops | **21** | |
| | • *Expertise enhancement projects* | 3 | 10, 32, 34[a] |
| | • *Skill-focused workshops* | 5 | 4, 14, 35[b], 38, 39[b] |
| | • *Guided practice* | 6 | 6[a], 11[b], 15 [b], 18 [b], 26, 46[a] |
| | • *Project-based inquiries* | 4 | 3, 17 [b], 41, 48 |
| | • *Structured models of learning* | 3 | 27, 33, 44 |
| | Learning communities | **8** | |
| | • *Learning communities organized by NUBTEs* | 1 | 2 |
| | • *Learning communities led by UBTEs or school district administrators* | 4 | 23, 36, 49, 51 |
| | • *Learning communities co-constructed by NUBTEs and UBTEs* | 3 | 5[b], 9, 47 |
| | University courses and certification programs | **5** | |
| | • *University courses* | 3 | 1, 19[a], 28 |
| | • *Certification programs* | 2 | 30, 45[a] |
| Informal learning | Traditional mentoring practices (i.e., apprenticeship approach) | **6** | 7, 12, 29, 42, 43, 50 |
| | Transformative mentoring practices | **11** | |
| | • *Coteaching/learning with teachers* | 7 | 8, 20, 24, 25, 31, 37, 40 |
| | • *Group mentoring* | 2 | 16, 22 |
| | • *External mentoring* | 1 | 13 |
| | • *Mentoring with released classroom duties* | 1 | 21 |

*Notes*. [a] indicates online learning; [b] indicates blended learning (i.e., a combination of online and face-to-face learning).

First, most formal learning took place in structured PD programs and workshops (n = 21) with specific learning objectives, designed modules, and set arrangements. Among them, expertise enhancement projects emerged with the aim of improving NUBTEs' subject knowledge and pedagogical content knowledge. In McAleer and Bangert's (2011) study, for instance, some content forums were developed based on research evidence concerning teacher PD, where NUBTEs brainstormed with UBTEs and student teachers about ways to solve dilemmas that may arise in teaching mathematics and reflected on their teaching experiences in an online learning community.

Another formal learning approach took the form of skill-focused workshops where NUBTEs learned the effective practice of teacher education (e.g., supervision, mentor conversation, and assessment), constructed and reflected on their roles as teacher educators, and made action plans for their future teacher education practice. Perry and Boodt's (2019) study exemplified how NUBTEs were able to develop their identities as practitioner researchers and teacher educators through a variety of learning activities, such as modeling, collaborative learning, and studying research evidence, with the support of UBTEs. The aim of these activities was to enhance NUBTEs' abilities in mentoring teachers and facilitating PD programs for teachers in an explicit and supportive manner.

The third formal approach to NUBTEs' professional learning was guided practice, which referred to the NUBTEs experimenting with novel ideas of teacher education practices in their supervision of teacher learners, benefiting from continuous program courses and the guidance of experienced consultants. Such learning typically began with training or orientation activities designed to introduce effective mentoring and teaching strategies based on UBTEs' research, reinforce relationships between NUBTEs and other program participants (e.g., other NUBTEs, UBTEs, program leaders), and explain the goals, standards, assignments, and procedures of teacher preparation programs (Beutel et al., 2017; Fletcher et al., 2018). More importantly, NUBTEs engaged in coaching practice in field schools with the sustained and individual support of UBTEs and other facilitators (e.g., program leaders and curriculum consultants) through school visits, scheduled seminars, and phone conversations (Koballa et al., 2010). As reported by Dille (2022), new NUBTEs participated in a sequence of courses that served to provide mentoring tools (e.g., observation and assessment forms) and help them maintain relationships with teacher candidates, make assessments, engage in reflection based on written logs, and create action plans for future practice.

Additionally, NUBTEs were provided with the opportunity to engage in project-based research inquiries as another formal approach. For instance, Athanases et al. (2008) conducted action research to investigate how a mentoring curriculum helped NUBTEs develop educative mentoring skills. The program employed formative assessments to gather feedback from NUBTEs, which was then utilized to improve the PD seminars by, for example, allocating more time for processing knowledge and offering diverse learning activities, tools, and resources tailored to meet NUBTEs' individual needs.

Several learning models for NUBTEs emerged from the reviewed studies, and they usually consisted of structured frameworks, staged procedures, guiding principles, or thematized tasks that could be used to systematically advance NUBTEs' professional learning. For example, Lyons et al. (2017) developed the motivational coaching model (MCM) as an alternative to the common belief that novice teachers are intrinsically motivated to change their teaching practices. It provided support for NUBTEs to apply motivational interviewing skills and utilize research-based evidence of behavioral change. The MCM was used to facilitate ongoing discussions with novice teachers, enabling NUBTEs to understand their values and emotions and motivating them to reflect on and modify their teaching practices.

Furthermore, eight of the analyzed studies explored the formal

learning of NUBTEs within professional learning communities, where NUBTEs and UBTEs examined teaching and mentoring issues together. Arnold's (2002) study reported that NUBTEs discussed teaching, learning, and problem-solving in a study group organized by a NUBTE who was also an English teacher in a high school. Alongside the major emphasis on instructional concerns, they also discussed their responsibilities as mentors and their support for student teachers. Following that, four studies explored NUBTEs' learning guided by UBTEs or school district administrators. In Guenther and Wexler's (2021) study, a White UBTE formed a mentor study group with five White NUBTEs. They held monthly talks that comprised discussing, learning, and goal-setting cycles, during which they explored social justice concerns in their instructional practices and reflected on their work with student teachers to assist them in advocating for social justice in their professional work. The remaining three studies investigated NUBTEs' co-constructed learning with UBTEs. For instance, Tunney and van Es's (2016) study involved seven meetings between UBTEs and NUBTEs to discuss the inconsistencies and problems in their mentoring practices. Collaboratively, they developed an observation tool that embodied their teaching visions and continued to refine it while applying it to support student teachers. Working with UBTEs enabled NUBTEs to gain a better understanding of mentoring practices and the goals and expectations of teacher preparation programs and align their guiding practices with those of UBTEs.

Finally, a few studies (n = 5) examined NUBTEs' learning in university courses and certification programs. Universities offered these programs for NUBTEs to obtain a certification or a continuing education credit for undertaking their roles as teacher educators. For instance, Leshem (2014) described a certification program initiated by the Ministry of Education of Israel and designed by UBTEs, which aimed to develop NUBTEs' identities and mentoring skills. Upon completing the course, NUBTEs were able to earn credit points in the PD system, increase their salary, and obtain a "mentor teacher" credential.

NUBTEs' formal learning was frequently facilitated through online and blended learning approaches. Online learning could reach a wide range of NUBTEs in various subject areas and grade levels while also offering sustained and easily accessible resources, making it an efficient and effective solution for NUBTEs who face barriers to face-to-face training or prefer a more flexible learning environment (e.g., Stoetzel & Shedrow, 2020). In-person learning, on the other hand, can provide NUBTEs with more individualized guidance and support in their school culture and classroom contexts (Melton et al., 2019). Blended learning, which combines online and in-person learning, can maximize the benefits of both approaches and has been used to promote NUBTEs' professional learning (e.g., Childre & Van Rie, 2015).

#### 3.2.2. *NUBTEs' informal learning approaches*

A summary of the studies (n = 17) focusing on NUBTEs' informal learning is presented in Table 5. Six studies showed that NUBTEs' informal learning occurred during traditional mentoring practices, while the 11 other studies highlighted that NUBTEs' informal learning was based on transformative mentoring practices.

A few studies demonstrated that mentoring student teachers in field schools could be a vital strategy for encouraging NUBTEs' learning and growth, although teacher preparation programs were not specifically designed to promote NUBTEs' learning and development. According to Smith and Nadelson (2016), NUBTEs' learning occurred when they supervised student teachers' teaching practice in STEM education. By observing the student teachers' use of inquiry-based learning with students of varying cognitive abilities and offering feedback, NUBTEs reflected on their own teaching practices and developed a greater desire to implement innovative teaching methods.

Moreover, NUBTEs engaged in informal learning through participation in transformative mentoring practices. In contrast to the conventional, one-on-one apprenticeship approach, these practices offered novice teachers greater autonomy and more equitable interactions with NUBTEs, which facilitated the learning not only of novice teachers but also of NUBTEs. Seven studies found that NUBTEs learn by coteaching with student teachers in a situated workplace. A typical example can be found in Carmi and Tamir's (2021) study. A student teacher and a NUBTE built a strong collaborative relationship in designing lesson plans and teaching, and the equal relationship between them gave the student teacher the freedom and agency to experiment with teaching ideas she had learned from university coursework. This approach allowed the student teacher to apply his expertise, which, in turn, influenced NUBTEs' learning of new ideas.

In addition, two studies investigated NUBTEs' informal learning in group mentoring practices, where NUBTEs provided individual mentorship to student teachers and collaborated with other stakeholders (e.g., mentor teachers, UBTEs, and school leaders) to maintain shared expectations for student teachers' learning on an organizational level. In the study of Grimmett et al. (2018), it was found that through dialogue and collaboration with UBTEs in supporting student teachers' reflective practice, NUBTEs developed a mutual understanding of how to support student teachers' learning about teaching and explored the pedagogical decisions behind effective teaching and learning.

The remaining two approaches to NUBTEs' informal learning included external mentoring and mentoring with released classroom duties. As outsiders to the school, NUBTEs (e.g., former master teachers, retired school leaders, and inspectors) re-evaluated their teaching values and the aims of mentoring to assist a group of novice teachers in questioning current practices and making changes in teaching practices, attitudes, beliefs, and student achievements (Daly & Milton, 2017). Another approach to NUBTEs' informal learning involved mentoring with released classroom duties, in which NUBTEs mainly focused on mentoring new qualified teachers without being responsible for classroom teaching themselves (Gilles & Wilson, 2004). Consequently, NUBTEs were able to gain a broader perspective of instruction, a developmental perspective of mentoring, and the courage and desire to experiment with new ideas learned from supervising student teachers across grade levels and by collaborating with universities.

Overall, many of the reviewed studies focused on NUBTEs' professional learning in formal settings. However, it is premature to conclude that NUBTEs engage in formal learning more frequently or intensively than informal learning because such information is not readily available in the reviewed articles for accurate synthesis. Publication bias would be another factor accounting for this review result. Additionally, the review results indicated that NUBTEs' professional learning was explicitly focused on practical issues in teaching and teacher education, involved collaborative inquiries with multiple stakeholders (e.g., UBTEs, school leaders, and district administrators), and focused on concrete actions for improving the practices of NUBTEs and teacher-learners. These findings highlighted several distinctive features of NUBTEs' professional learning approaches, and we compare these features with those of UBTEs in the "Discussion and implications" to shed light on how NUBTEs and teacher educators in general could learn more effectively.

### 3.3. *Research methodologies used to study NUBTEs' professional learning*

Table 6 displays the distributions of the overarching research approaches in the 51 reviewed articles. Studies adopted quantitative,

**Table 6**
Research methodologies used to study NUBTEs' professional learning (N = 51).

| Research Approach | Count | Article ID |
|---|---|---|
| Quantitative | 2 | 33, 48 |
| Qualitative | 33 | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 20, 21, 22, 23, 24, 25, 26, 28, 29, 30, 31, 37, 38, 40, 42, 45, 49, 50, 51 |
| Mixed-methods | 11 | 14, 16, 17, 18, 19, 32, 34, 39, 41, 43, 46 |
| Action-oriented | 5 | 27, 35, 36, 44, 47 |

qualitative, mixed-methods, and action-oriented approaches in various numbers to examine NUBTEs' professional learning, but the qualitative approach was the dominant choice.

Many studies (n = 33) used the qualitative approach to guide their empirical investigations into NUBTEs' professional learning. They contributed interpretations of what, how, and how well a particular group of NUBTEs sought professional learning in their situated contexts. For instance, Nilsson and van Driel (2010) used a qualitative case study to examine what two student teachers and their mentors learned from planning and reflecting on each other's science lessons. This qualitative study identified that the student teachers and their mentor teachers collaboratively improved their instructional knowledge, subject-matter knowledge, and knowledge of pupils in their situated contexts. Similarly, Carmi and Tamir (2021) used a multiple case study to explore the relationships between student-teachers and their mentor teachers. This study proposed a model of how student teachers could use resources and exercise professional agency to advance their mentor teachers' professional learning—a direction of influence barely examined by previous studies. Likewise, Daly and Milton (2017) adopted a narrative inquiry to investigate 70 mentor teachers' lived experiences of transitioning to their new professional roles as NUBTEs. The researchers identified several themes regarding the complex process of learning to become mentor teachers (e.g., reconceptualizing professional learning) and outlined a series of principles for supporting mentor teachers' professional learning and work (e.g., inter-mentor dialogue, meta-awareness of learning and development).

The second most frequently adopted research approach was the mixed-methods approach, and 11 studies fell into this category (e.g., Fletcher et al., 2018; Fransson, 2016). These studies capitalized on quantitative and qualitative methods to investigate NUBTEs' professional learning. For instance, Tschannen-Moran and Carter (2016) configured a mixed-methods study to examine how a 20-h coach training intervention influenced the emotional intelligence of 90 instructional coaches. The quantitative part involved comparing a pre- and post-test to identify the changes in the participating instructional coaches' emotional intelligence levels. The qualitative part delved into how the enhanced emotional intelligence helped improve the instructional coaches' professional performance. The research results showed that instructional coaches' emotional intelligence improved through training, which further enhanced the awareness of their roles as instructional coaches, their abilities to listen to and empathize with teachers, and the overall effectiveness of coaching teachers.

Five studies (e.g., Kuzle & Biehler, 2015; Melton et al., 2019; Nielsen et al., 2010; Stein et al., 2022; Tunney & van Es, 2016) adopted an action-oriented approach. Researchers in these studies—mostly UBTEs—collaborated with NUBTEs in various forms to study and advance NUBTEs' professional learning in practice. For instance, Kuzle and Biehler (2015) conducted an action-oriented study on how to design PD courses to support mentor teachers in teaching data analysis to teachers. Based on their critical evaluation of and reflection on a five-month course of "Competence-oriented teaching and learning of data analysis" designed for 12 mathematics mentor teachers, the authors identified six principles of designing effective PD courses for mentor teachers (e.g., learner orientation, case-based learning). Similarly, Stein et al. (2022) designed, enacted, and reflected on a training program for enhancing 32 instructional coaches' abilities to help teachers enact conceptually rich, student-focused mathematics lessons. Based on their analysis of empirical data generated over a two-year period, the researchers found that their design-based, inquiry-oriented, and collaborative practices in the training program had improved the participating instructional coaches' professional abilities as teacher educators in and through action. Notably, none of the five action-oriented studies was led or independently conducted by NUBTEs. This finding raised questions about NUBTEs' motivation, preparedness, practice, and impact of using action research to promote their professional learning and growth.

Last, only two studies we reviewed (i.e., Lyons et al., 2017; Veenman et al., 2001) used the quantitative approach. Lyons et al. (2017) reported a quasi-experimental study that tested the effectiveness of a three-day PD seminar focused on providing instructional coaches with explicit, evidence-based training to support novice teachers in making positive behavioral changes. Based on the pre- and post-measuring of the participating instructional coaches' mentoring behaviors and the various statistical analyses of the measurement outcomes (e.g., multilevel modeling), the researchers identified no statistically significant improvement toward the targeted coaching practices in the participating instructional coaches, which suggested a need to help instructional coaches develop interactions that were more consistent with the targeted coaching practices. Veenman et al. (2001) also used the pre- and post-test design. Statistical calculations such as one-tailed t tests and analyses of covariance (ANCOVA) were used to determine whether a training program had significantly improved cooperating teachers' coaching skills. The analysis results showed partial effectiveness of the training program and suggested directions for developing cooperating coaches' skills in balancing guidance with autonomy and personal support with critical reflection.

In summary, the research methodologies used to study NUBTEs' professional learning were dominated by collecting and analyzing qualitative data with a small number of participants. Quantitative and action-oriented methods were rarely used. The qualitatively oriented studies have produced context-specific and generative interpretations of the complex phenomenon of NUBTEs' professional learning. However, cross-contextual and large-scale empirical investigations are currently scarce, which has made the knowledge base of NUBTEs' professional learning less helpful in informing large-scale policy formulation and practice improvement. We elaborate on this point and provide methodological suggestions for future research in the next section.

## 4. Discussion and implications

By systematically synthesizing 51 empirical articles on NUBTEs' professional learning published between 2000 and 2022, this review study identified the main contents of and approaches to NUBTEs' professional learning and critiqued the research methodologies used in the reviewed articles. Overall, the review results portray the landscape of the existing research on the professional learning of NUBTES—a practically situated, increasingly important, but traditionally understudied group of teacher educators. This study can strengthen the knowledge base of NUBTEs' professional learning, suggest practical implications for stimulating NUBTEs' professional learning, and point out several imperative directions for future studies on NUBTEs' professional learning.

First, this study adds an empirical-research-based framework of NUBTEs' professional qualities to the literature. The framework specifies five general categories and a host of subcategories of NUBTEs' professional qualities. In Table 7, we juxtapose previous studies' (e.g., Ping et al., 2018) findings about UBTEs' professional learning and NUBTEs' professional learning identified in this study. As shown in the table, UBTEs' and NUBTEs' professional learning contents share two commonalities. First, they follow a similar structure that involves the disposition-, knowledge-, practice-, and development-related qualities that professionally qualified teacher educators are expected to possess. Second, several contents are emphasized in the professional learning of both UBTEs and NUBTEs, such as teacher educator identity (disposition), knowledge of the teacher education profession (knowledge), mentoring and supervision strategies (practice), and reflective skills (development). The reason is that UBTEs and NUBTEs share a common role and responsibility: guiding and supporting preservice and in-service teachers' professional growth as teacher educators. Therefore, there are no significant differences between the overall structure of their professional learning contents.

However, our comparison reveals a significant difference between the professional learning contents of UBTEs and NUBTEs. While

**Table 7**
A comparison of UBTEs' and NUBTEs' professional learning contents and approaches.

| | UBTEs (Ping et al., 2018) | NUBTEs | Comparison |
|---|---|---|---|
| Professional learning contents | Professional identity<br>Teacher educator identity<br>Researcher identity<br>Knowledge base<br>Content knowledge<br>Pedagogical content knowledge<br>Knowledge of curriculum<br>Knowledge about the profession<br>Pedagogy of teacher education<br>Learning about teaching<br>Teaching about teaching<br>Mentoring and supervision<br>Research and reflection<br>Research<br>Reflection | Dispositions<br>First-order (e.g., confidence, motivation)<br>Second-order (e.g., awareness, identity)<br>Knowledge<br>First-order (e.g., the main types of teacher knowledge proposed by Lee Shulman)<br>Second-order (e.g., knowledge of teacher learners, teacher education pedagogies, teacher education contexts)<br>Practice<br>First-order (e.g., classroom teaching practice)<br>Second-order (e.g., general principles of teacher education, specific strategy of teacher education such as mentoring)<br>Inquiry skills<br>Critical thinking skills<br>Reflective thinking skills<br>Action research skills<br>Others (e.g., leadership, collaboration) | **Similarities:**<br>1 Follow a similar structure<br>2 Emphasize several similar contents (e.g., teacher educator identity, knowledge about the profession, core practices of teacher education, research/ reflection skills)<br>**Difference:**<br>1 Emphasize research-oriented contents more for UBTEs (e.g., researcher identity, making knowledge contribution) while stressing practice-oriented contents more for NUBTEs (e.g., focusing on both first-order and second-order teaching practices, action research skills) |
| Professional learning approaches | Academic engagement<br>Doing research<br>Academic activities<br>Collaboration<br>Getting input from others<br>Learning community<br>PD programs<br>Research-related PD programs<br>Educational PD programs<br>Reflection<br>Collaborative reflection<br>Individual reflection | Formal<br>PD programs and workshops<br>Learning communities<br>University courses and certification programs<br>Informal<br>Traditional mentoring practices<br>Transformative mentoring practices (e.g., coteaching, group mentoring) | **Similarity**<br>1 UBTEs and NUBTEs use several similar professional learning approaches (e.g., PD programs, learning communities)<br>**Differences:**<br>1 UBTEs use research-related approaches more (e.g., doing research, attending research-related PD programs) while NUBTEs use practice-related approaches more (e.g., skill-focused workshops)<br>2 UBTEs mainly use formal approaches while NUBTEs use both formal and informal approaches (e.g., learning as a byproduct of engaging in teacher education practices)<br>3 UBTEs are usually the designers and leaders while NUBTEs are the participants and followers in their collaborative learning practices |

research-oriented content is emphasized for UBTEs, practice-oriented content is stressed more for NUBTEs. The literature reviews have shown that research and publication are the core qualities that UBTEs should possess because generating new knowledge is a primary responsibility of university staff (Ping et al., 2018; Saito, 2013).

In contrast, NUBTEs are not institutionally affiliated with universities; thus, there is less emphasis on research for NUBTEs' professional learning. Instead, the primary focus of NUBTEs' professional learning is on practical aspects of teaching and teacher education. NUBTEs' primary role is as teachers of K-12 students. Their secondary role—teachers of teachers—comes after the role of teachers and largely depends on whether they choose or are appointed to guide preservice or in-service teachers in their situated contexts. Therefore, compared to UBTEs, most NUBTEs function simultaneously in dual roles and need a bifocal perspective as teachers and teacher educators (Dille, 2022; E. White et al., 2015).

Overall, the framework of the professional learning contents can serve as a conceptual reference for future studies to explore what professional qualities NUBTEs should possess and how to properly convert and integrate them into the content of NUBTEs' professional learning. However, several thorny questions are not sufficiently addressed in this review and await further investigation. For instance, should a NUBTE possess all the professional qualities identified in this review? Are some qualities more important than others in general and for a specific subgroup of NUBTEs? How do NUBTEs' first- and second-order qualities relate to and interact with each other in supporting NUBTEs' professional work? How can PD programs help NUBTEs to be more explicit in relating first-order teaching to second-order teaching? Are there any other qualities not examined in the existing empirical studies, but that NUBTEs actually need to learn and develop, especially in the post-pandemic era when technology, education, and society are dramatically shifting? How can those emerging qualities be identified and how can they be integrated into the current quality framework? We call for future empirical and theoretical studies to use these questions as a guide to refine the quality framework for NUBTEs emerging from this review.

Second, this study identifies a range of potentially effective approaches to stimulating NUBTEs' professional learning, which can inform the design of PD programs and learning experiences for NUBTEs. Many NUBTEs in the reviewed studies reported positive influences of formal learning programs on their work and growth as teacher educators (e.g., Belton et al., 2010). In particular, the existing studies have suggested that structured preparation and training enabled NUBTEs to consciously enact their new roles, strengthen their professional knowledge base, and improve their practical strategies and abilities as teacher educators (Ambrosetti, 2014; Childre & Van Rie, 2015; Dever et al., 2003; Elyashiv & Levi-Keren, 2022; Lyons et al., 2017). These findings can inform relevant stakeholders in configuring appropriate formats,

approaches, and methods for advancing NUBTEs' professional learning and growth. For example, the combination of formal and informal learning would better promote NUBTEs' professional growth. When NUBTEs supervise teacher learners, a systematic curriculum that features practice-focused, collaboration-centered, inquiry-oriented, and action-anchored could be consciously designed to improve their teacher education abilities. This implication was championed by many previous researchers articulating that competent teacher educators do not emerge naturally from being good teachers of pupils but from a conscious learning process with structured support (Athanases et al., 2008; Betlem et al., 2018). However, Tschannen-Moran and Carter's (2016) study also reminded us to cautiously interpret the self-reported positive effects because their study found that the NUBTEs who voluntarily attended PD programs tended to have more positive learning experiences and outcomes than those who were "forced" to attend PD programs. This and other studies (Landt, 2004; Salo et al., 2019) highlight motivational factors' foundational and pivotal role in shaping NUBTEs' professional learning, which calls for more research attention.

Furthermore, by comparing NUBTEs' professional learning approaches with UBTEs' as identified by previous studies (e.g., Ping et al., 2018), we identify both similarities and differences. As shown in Table 7, UBTEs and NUBTEs use several similar approaches to advancing their professional learning, such as PD programs and learning communities. The main differences lie in three aspects. First, while UBTEs mainly use research-related approaches (e.g., doing research, attending PD programs focusing on improving research abilities), NUBTEs tend to use practice-related approaches more (e.g., skill-focused workshops). Second, UBTEs mainly use formal approaches (e.g., formally organized research projects, partnerships, PD programs), while NUBTEs use both formal and informal approaches (e.g., learning as a byproduct of engaging in teacher education practices). Third, UBTEs are usually the designers and leaders, while NUBTEs are the participants and followers in the collaborative learning activities co-conducted by UBTEs and NUBTEs. In other words, NUBTEs are mainly guided by UBTEs in their learning, with less independent and self-organized learning activities. Accordingly, several thorny questions arise that are worth examining further: What is the status quo of the interaction and quality of collaboration between NUBTEs and UBTEs in different settings? Who should organize, lead, and guide the learning of UBTEs, and why? Can joint development be achieved through collaboration between these two groups? How can this collaboration be effectively accomplished?

Finally, this study outlines several imperative methodological lines of research for future studies on NUBTEs' professional learning. Most of the reviewed studies adopted the qualitative research approach, which corresponds with the findings of other literature reviews (e.g., Hinostroza, 2020; Izadinia, 2014; Li & Sang, 2022). This finding implies that many scholars in this research field adopted an interpretivism-oriented epistemological belief and viewed NUBTEs' professional learning as a personally engaged, interpersonally constructed, and socio-culturally embedded phenomenon. The qualitatively oriented studies have constructed contextualized knowledge to inform local practices. In contrast, the three other research approaches, especially the quantitative and action-oriented approaches, were much less frequently used. As a result, previous studies have produced little knowledge about NUBTEs' professional learning in a cross-contextual, large-scale, statistically generalizable sense. The lack of such knowledge renders the existing studies on NUBTEs' professional learning less helpful in informing policy decisions that would influence a large population of NUBTEs in a region, country, or internationally. In light of this observation, more quantitative studies that use valid and reliable instruments, generate large-scale and longitudinal data, and explore statistically representative and generalized knowledge should be conducted in the future. More mixed-methods studies using multiple sources of data sources also should be employed to facilitate the long-term maturation of the research field focusing on NUBTEs' professional learning (McEvoy et al., 2015).

Another issue revealed by the research approach distribution was that only a few scholars took the action-oriented research approach, and no NUBTEs were the independent or leading actors in those studies. This finding implied that NUBTEs might still be positioned as the "subjects" of university-based scholars' research, which in essence contradicted the spirit of action-oriented research that stressed the importance of researchers taking the lead in seeking improvement in and through their own deliberate actions (Vaughan & Burnaford, 2016). Therefore, in future studies, more NUBTEs should receive support to actively participate in action-oriented research and begin to voluntarily, deliberately, and reflectively seek professional learning and growth in, through, and for their professional practices as teacher educators.

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## Declaration of competing interest

No potential conflict of interest was reported by the authors. We all contributed to and approved the final article.

## Data availability

Data will be made available on request.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.tate.2023.104374.

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