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Professional elementary teachers in the digital era: A systematic literature review

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ABSTRACT

Teachers of elementary school must be professional and have digital skills in Revolution 4.0, and Society 5.0 age progresses. This article includes a thorough assessment of the research on elementary school teachers' professional competence, professional development, and digital competence. This research is needed to determine what professional elementary school teachers did and why they should be professionals in the digital age. The writing of this systematic review of literature articles was assisted by the Publish or Perish 7, Mendeley, VOSviewer, and Nvivo 12 Plus application. The search for articles in Scopus indexed journals is limited to the last 11 years (2010-2021). From the search results, there were 100 Scopus indexed articles, then articles were selected according to compatible themes into 31 selected articles. Professionals' teacher, professional development, pedagogical content knowledge, teacher professional development, professional development program, and professional competence are among the findings of the theme/topic. The articles were analyzed according to the topics determined through the NVIVO 12 Plus. This article contributes to subsequent research and becomes a study for the theme of professional elementary school teachers and teacher competence in the digital era.

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1. INTRODUCTION

The progress, stagnation, or decline of education is largely determined by the teacher. This formula has been recognized worldwide because teachers are the core of all programs and activities to improve the quality of education. Elementary school teachers according to research findings are said to be too busy with bureaucratic-administrative work and have not fulfilled professional duties [1], [2]. If this administrative task is not balanced with quality improvement in accordance with the times, it will erode their adaptability. For quality improvement, teachers do not have to learn in the formal but also informal domains [3], [4]. Changes on the education side, are needed long-term solutions as the answer to an existing problem in the form of strategies, development, and positive responses through increasing teacher professionalism in the digital era [5]. The digital era is an era of technology conversion which is characterized by migrating activities to paperless, operating systems, internet networks, applications, and cloud systems, for the purpose of being effective, efficient, accurate, and productive [6], [7].

Change in education as a result of the onslaught in the disruption era, as well as the waves of the Industrial Revolution 4.0 and Society 5.0, require a total increase in elementary school teachers' professional abilities [8]. Other research has found that the demands of the digital era have not been mastered by teachers. One of the competencies of teachers in the digital era must master information literacy, process and search

for digital-based data for learning purposes [9]. Another research reveals that teachers needed to adjust to the Industrial Revolution 4.0 age. Teachers must have critical thinking ability, problem solve ability, effectively communicate ability, and cooperation in the digital era [10], [11] There was research that has attempted to trace the capacities of professional elementary school teachers in the digital era based on these studies. However, few studies on primary school teachers' professional competence in the digital era have been performed.

Teachers in addition to educate are required to master technology, should not resist, and must transform. They are tasked with designing classrooms to be innovative, creative, and fun for students [12]. Teachers in the digital era must have educational competencies, competencies for technology monetization, competencies in globalization, competencies in future strategies, and counselor competencies [13]. These show that the digital era requires a teacher to master cyber- and base technology skills.

Other research stated that the ability of elementary school teachers in Indonesia to master information and communication technology (ICT) for learning [9], such as Moodle, comic media, mobile learning media, and other e-learning applications still need improvement [14], [15] Beside of master pedagogical, personality, social and professional competencies, in current development is required by a teacher to master competencies to make use of information, information technology, and mastery of new technologies in facilitating learning activities [16]. Efforts to improve quality and professional competence must be carried out by teachers in addition to pedagogical, personality, and social aspects [17]. Although these competencies are inherent in teachers, the reality is that not all elementary school teachers become professional teachers in the digital era.

A number of studies have found that certification as a government legal tool to determine teacher professionalism cannot be used as a measure. The long working period and the master's level of education also do not determine the professionalism of elementary school teachers [18]–[20]. The findings show that elementary school teachers are not maximal in mastering digital competencies. Even if they are certified, have various pieces of training, have master's and even doctoral degrees, and have long teaching experience, these could not be used as indicators of teacher professionalism in this digital era [21]–[23]. Generally, this background is to explore an overview of professional elementary teacher articles in the digital era which are reviewed and analyzed by using the Systematic Literature Review method. The expected result is to provide an overview of the theory or concept of a professional elementary school teacher in the digital era.

The researcher asked on main research question how is current literature informed by professional elementary school teachers. The specific research questions of the study are: i) How is the professionalism of elementary school teachers most mentioned?; ii) How is the most mentioned professional development status of an elementary school teacher?; and iii) How is the performance of elementary school teachers in the context of the most mentioned digital competencies?

2. RESEARCH METHOD

The research method adopted was "A systematic literature review". A systematic literature review is a research method for locating, evaluating, and interpreting significant research findings connected to research questions, specific topics, or phenomena [24]–[26]. The aim is to find out how the professional competence of elementary school teachers, professional development, and digital competence in the articles reviewed. This study reviews articles in scientific journals indexed by Scopus with the keywords: professional teacher, elementary school teacher, and teacher professional development. The search for articles in Scopus-indexed journals is limited to the last 11 years, namely 2010-2021, assisted by the Publish or Perish 7, Mendeley, VOSviewer, and Nvivo 12 Plus applications. From the search results, there are 100 Scopus-indexed articles. Then the selection of articles according to compatible themes was made to 41. The selection process was adjusted to compatible themes and finally, 31 selected articles were found, while 10 articles that didn't fit into that category were not used, which resulted in the remaining 31 articles of these 31 articles, they were analyzed according to the topics set through the Nvivo 12 Plus application and then concluded. The stages of this research apply the scheme of Bettany-Saltikov [27] presented in Figure 1.

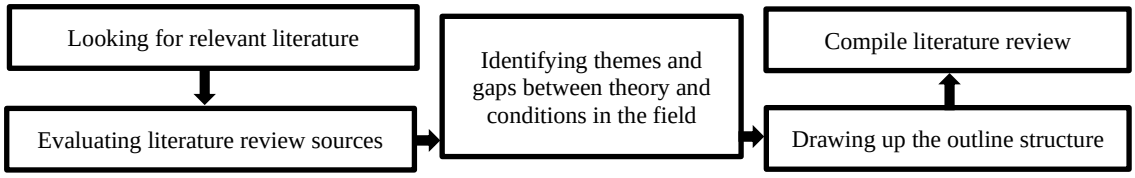

Figure 1. Bettany-Saltikov's literature review step

3. RESULTS AND DISCUSSION

An in-depth analysis of the articles that will be utilized as a systematic review of literature is required here in order to answer research questions and enhance compatible research arguments. Figure 2 shows how the author uses the VOSviewer tool to examine the beginning of thematic associations. The distribution of articles based on keywords is represented in Figure 3.

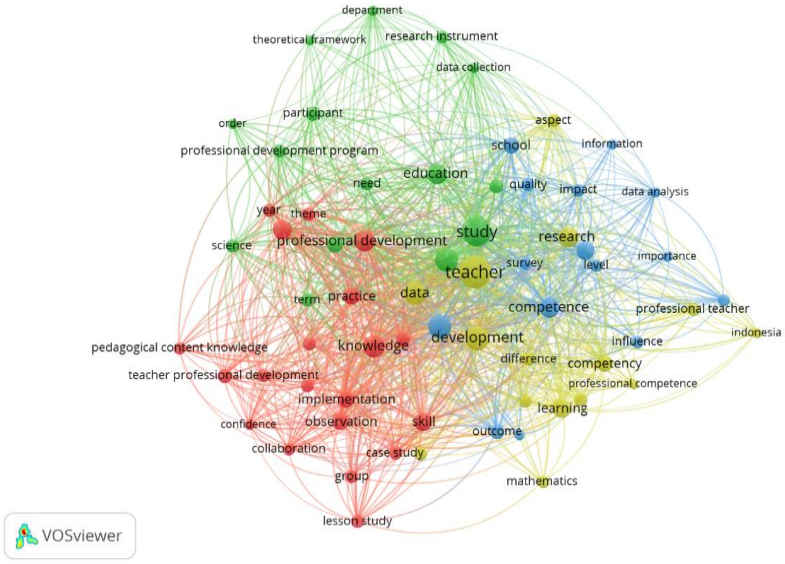

Figure 2. Initial network visualization

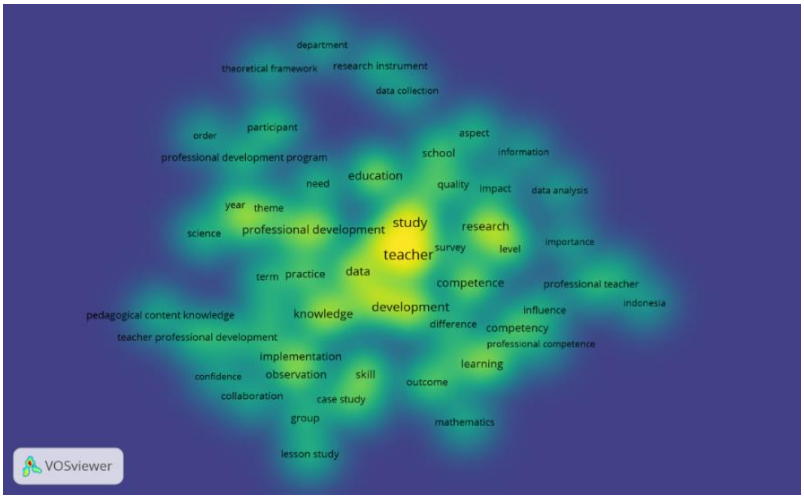

Figure 3. Visualization of the distribution of articles by keyword

From Figures 2 and 3, it could be seen that discuss and study of the professional elementary school teacher in the digital era show closeness to a number of other study topics. The themes of a professional teacher, professional development, knowledge, pedagogical knowledge, teacher professional development, professional development program, and professional competence are common elements in the 41 articles visualized in Figures 2 and 3. Other themes that appear are education, school, study, teacher, competency, learning, and others that are relevant directly or indirectly. Meanwhile, studies on professional elementary school teachers in the digital era have not yet appeared. From this initial analysis, the authors mapped articles that have direct interconnection related to how to build professional elementary school teachers in the digital era. Table 1 presents the mapping result from 31 publications.

Table 1. Mapping results for 31 Scopus articles

Number	Year	Relevance to theme
1	2010	Teacher professional development, teaching and teacher education [28]
2	2010	Elementary school teachers [29]
3	2010	Professional development, teacher learning [30]
4	2011	Elementary teachers [31]
5	2011	Professional learning, and development of professionalism [32]
6	2016	Teacher professional development [33]
7	2016	Teacher competence [34]
8	2017	Professional learning [35]
9	2017	Elementary school [36]
10	2018	Professional digital competence [37]
11	2019	Elementary, professional development [38]
12	2019	Elementary school teacher, pedagogic competence [39]
13	2019	Pedagogical content knowledge, teacher professional development [40]
14	2019	Active teaching methods and active learning [41]
15	2019	ICT, professional competence, prospective teacher students [42]
16	2019	Pedagogical content knowledge [43]
17	2020	Elementary school; In-service teacher training; Professional development [44]
18	2020	Professional dialogue, and professional development [11]
19	2020	Professional competence [45]
20	2020	Professional development [46]
21	2020	Professionalism, teacher, industry 4.0 [47]
22	2020	Madrasah teacher, professional [48]
23	2020	Competence pedagogy, teacher challenges [49]
24	2020	New teacher competence, professional teacher, teacher professional education [50]
25	2020	Instrument application IR 4.0, pedagogy, professional [51]
26	2020	Professionalism, competence, and teacher performance [52]
27	2021	In-service professional development [53]
28	2021	Effective professional development [54]
29	2021	Professional development program [55]
30	2021	Teachers' development [56]
31	2021	Teacher development; professional development [57]

3.1. Elementary school teacher professional competence

As discussed, the certification has focused on maintaining teacher professionalism. For teacher candidate competency instruments, training certification also uses a website-based application. However, in Indonesia, teacher certification has no effect on performance or motivation 10 years after certification, implying that certification allowances have little impact on performance. As a result, the graduate evaluation and selection procedure for teacher certification must be modified in order for the govt certification program to meet its goals [51]. They are strongly supported by the leadership of the professional principal, teacher efficacy, courses, discussions, and development through the professional community [58]. Teachers have proven their professional competence in educating, teaching, guiding, directing, training, assessing, and student evaluating [52].

Professional teachers are those who are professional in teaching and professional in carrying out their profession [47]. Professional teachers must be capable of creating a curriculum and planning the lesson and how they can improve their professional knowledge and competence through social interaction. They should undertake a goal-oriented development curriculum, lesson planning, professional dialogue, and professional development. In addition, the teachers in Taiwan who teach the same material as other teachers are required to form a committee and meet regularly to discuss the curriculum to realize professionalism [11].

Teachers with professional positions must have four mandatory competencies: pedagogic competence, professional competence, social competence, and emotional competence. According to the indicators, the Indonesian Government performs periodic Teacher Competency Tests on teachers to map the extent to which they have these competencies [36], [39]. A prospective teacher must also possess the top 10 Industrial Revolution 4.0 skills classified by the World Economic Forum, which also include complex problem solving, critical thinking, creativity, people management, cooperation, emotional intelligence, judgment and decision making, customer orientation, negotiation, and cognitive flexibility [51].

Professional teachers must be competent in the pedagogical competence instrument consisting of nine competencies: i) Mastering the physical, moral, spiritual, social, cultural, emotional, and intellectual features of students; ii) Acquiring learning theory and instructing learning concepts; iii) Create a curriculum that really is relevant to the subjects being taught; iv) Organize educational learning; v) Capability of information and communication technology for academic purposes; vi) Assisting students in realizing their various potentials by encouraging their development; vii) Communicate with pupils effectively,

empathically, and courteously; viii) To examine and evaluate the learning processes and outcomes; and ix) To place the assessment and evaluation of learning results into action [51].

The teachers' professional attitude is derived primarily from within. If they have a good attitude will merely produce or consider their duties as daily routines. Professional teachers are those that teach with sincerity in order for teachers to be more enthused about teaching and to effectively convey their knowledge. The teacher's sincerity in teaching occurs because of one's own desire, and because one has a teaching commitment, namely attachment to one's duties and obligation as a teacher who can bear responsibility for acquiring knowledge [52].

An objective assessment of teachers' pedagogical content knowledge (PCK) is required in the context of teacher professional development and certification. This study is a case study to assess of PCK performance of the prospective teacher in Indonesia who are enrolled in a teacher professional development program [34], [40], [44]. In addition, to build professional competence, teacher training is needed because it has the effect of mastering learning competencies [49]. When novice teachers are being educated to become professional teacher candidates, they must be able to plan, assess, build professional knowledge and practice, as well as construct and cultivate a real vision for lifelong learning. Professional training enables people to actively acquire practice-based knowledge based on specific learning materials [31].

3.2. Elementary teacher professional development

The professionalism of the teacher emphasizes how instructors see themselves (identification) and how they interpret and carry out their work based on their knowledge and beliefs (teaching practice). The focus of this study is on a discourse on teacher labor that is distinct from the management discourse on teachers, policymakers, and education authorities [28]. There is substantial evidence according to several studies [29], [33], [44], [45], [50], [59]–[62] that showing a clear shift away from traditional professional teacher development programs which typically consist of short-lived, a fragmented workshop designed toward more sustainable, integrated and intensive professional development activities in nature [53]. This means that elementary school teachers' professional development must keep pace with the times.

The professional development of teachers becomes one of the important keys in most of the recent educational reforms in the world. Regardless of the purpose, a teacher professional development program is traditionally delivered in the form of workshops, seminars, conferences, or courses. This way in the 1990s shifted to the present that teacher professional development programs must be participant-centered, knowledge, assessment, and community-centered to optimize teacher learning [30]. Professional development is an important mechanism that can improve teacher content knowledge and the quality of teaching practice [47].

Collaboration within the community of practice is required for teacher professional development. Collaboration between schools, groups, and organization is significant and fruitful. Over the years, many schools have worked with a variety of partners, including university administration, local community leaders, and non-governmental groups (NGOs) [63]. This collaborative program helps strengthen the community of practice, which is often the springboard for early teacher development and provides constant and ongoing on-the-job training for the teacher. The teacher receives professional assistance and advice from a specialist in various subjects and specializations as a result of this collaboration. One of the strategies provided by the community of practice to assist continuous professional teacher development is a partnership. For teachers to grow professionally, they must participate in the community of practice [46].

Teacher professional development activities are a need that must be met by improving their quality. Most developed countries' in-service teacher professional development program is structured and well-funded to accommodate every teacher on a regular in-service professional development program, with the goal of improving teacher classroom practice; thus, these countries' in-service professional development programs have become significant references [53]. According to researchers [64], [65], subject departments, as a type of school organization, have a favorable impact on teachers' professional development and active pedagogical leadership if they function as communities aiming to exert influence across the school [28].

In Malaysia, teacher professionalism is developed through lesson study activities, i.e., professional activities that are divided into four phases. First, identify a goal and organize a research lesson (RL) based on the subject curriculum, unit objective, and competency requirement. Second, present the research lesson: one of the implementing teachers does the RL in front of the class. Third, lesson analysis from an educational standpoint aims to foster a common professional culture rather than just professional development activities. Fourth, the use of lesson study as a novel professional development paradigm for teachers in public schools [55]. Increased knowledge of subject matter and instruction, increased students' observing abilities, stronger collegial network, stronger connections from daily practice to a long-term goal, increased motivation and sense of efficacy, and improved plan quality available lesson are all part of the teacher's professional development model [54]. Increased subject matter and instruction knowledge, increased students' observing abilities, stronger collegial network, a stronger connection from daily practice to a long-term goal, increased

motivation and sense of efficacy, improved plan quality, and available lessons are all part of the teacher's professional development model [35]. A teacher needs to expand the learning experience so that their professionalism develops [41].

Professional knowledge (which includes systematic learning and teaching knowledge) and the need for a specific pedagogical context. As a result, he recommends case-related reflection as a required skill for a professional adult educator. Because the development of these professional qualities is inextricably linked to personal growth [66], as a result of the learning process, the concept of professionalism is required. Referring to the learning approach also refers to the process of becoming a professional teacher during a teacher's career [32].

3.2.1. Elementary school teacher digital competence

One of the indicators for an elementary school teacher who masters digital competence is mastery of ICT, and digital literacy in the industrial era 4.0 [37], [38], [50]. This is supported by the opinion of Aoun [67] who said that three new literacies were required in the Industrial Revolution 4.0 era: technology literacy, data literacy, and human literacy. Training is required to make this happen. The first stage entails developing an instrument grid/construct that encompasses much more than the four primary competencies (pedagogic, professional, social, and personality). However, there are also three types of literacy, as well as the top 10 skills or competence required in the Industrial Revolution 4.0 age (data, digital, and humanitarian) [51].

In order to improve their professional competence, prospective teacher and teacher must understand legitimate, practical, and effective ICT. All of their literacy skills will eventually follow the development of the expanding digital literacy period after they are ICT literate [42]. Other pedagogical abilities, such as practical knowledge, subject content knowledge, pedagogic content knowledge, pedagogical technology knowledge, and teaching professional behavior and attitude of the instructor, must be fostered in the teacher [48]. To prepare for professional teacher development in the digital age, the teacher must be ready to use a combination of blended lesson study and clinical supervision. In this study, we will look at how and what tactics are used to prepare teachers for ongoing professional development [56]. Teachers can at least design education by learning science, technology, engineering, and mathematics (STEM) in the digital era because it has an impact on national education development [38]. Teachers in the digital era must be able to design STEM because it is an integrated approach that adapts to the era [57].

Initial teacher education (ITE) must equip instructors with theoretical knowledge through seminars, training, and workshop on campus, as well as classroom practice in the digital world [68]–[70]. A longitudinal study that followed 110 teachers and students of ITE from their early teaching years [71], revealed that students expect teacher competence in their role as professional teachers in school. This is confirmed for freshly qualified teachers (those who have been in the classroom for two or three years) and then for the more experienced instructor (working for five or six years). These findings suggest that the ITE experience aids the teacher in developing professional competence and confidence in their future career as an educator. A faculty member at ITE is supposed to assist students with ICT [37]. This support strengthening the new digital competence of teacher so that classroom learning is of higher quality.

Teacher competence in teaching is assessed from many aspects such as teacher pedagogical knowledge, teacher self-efficacy, and others that must be consistently leveled. A teacher who has an educator spirit creates a commitment to be applied in the professional development of the teacher. Teacher quality is shaped by teacher education and professional development program, with the goal of improving student academic achievement through teacher growth. Therefore, the implementation of the idea of a professional teacher in a teacher preparation program and teacher professional development needs to be emphasized recently [43]. Mastery of computer science for racial literacy is also essential as a vital professional development framework that will assist instructors in the field [48].

4. CONCLUSION

A professional elementary school teacher from the reviewed article shows that they are not only built through undergraduate education, certification, and formal programs. However, the professional teacher needs to be built through various activities, programs, partnerships, and changing patterns. Professionalism also needs to be built through the teacher himself. In the digital era like today, a teacher needs to update their ICT knowledge and skill in order to design learning that adapts to the time and need of a student. Furthermore, this study recommends future research directions to explore the themes of a professional primary school teacher and teacher competencies in the digital era.

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