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Conceptual Model of Electronic Teachers' Professional Competence Assessment System

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Received: October 24, 2021 ▪ Reviewed: November 27, 2021

▪ Accepted: December 23, 2021 ▪ Published: January 28, 2022

Abstract:

Electronic assessment systems are increasingly used during the COVID-19 pandemic, especially in online learning. The electronic assessment provides many benefits, including monitoring student progress, providing direct feedback, and supporting flexible and adaptive learning. The teaching practice program in schools aims to strengthen the professional competence of teachers in teaching students. Distance and time, frequency of lecturer visits, analyzing portfolio assignments, and the absence of an assessment handbook for lecturers and teachers are obstacles in implementing a comprehensive assessment of teachers' professional competence. Therefore, an integrated and holistic assessment system is needed that involves students, teachers, and lecturers. This study aims to conceptually describe the electronic-based teachers' professional competence assessment system in the student teaching practice program in schools, describe in detail and systematically assessment, electronic professional assessment, teachers' professional competence, and teaching practice concepts; provide theses on the concept of electronic assessment of teachers' professional competence. This research examines concepts related to the electronic-based teachers' professional competency assessment system and its implementation. They include theoretical studies, synthesis, and conclusions. The literature used comes from books and research journals. The literature study result is a synthesis of concepts and conclusions that can be used to develop procedural and physical models of the electronic teachers' professional competence assessment system. The novelty of this research is that technology-assisted electronic-based assessments are designed automatically.

Keywords: assessment, conceptual model, electronic assessment, professional assessment, teachers' professional competence, teaching practice.

电子教师专业能力测评系统概念模型

摘要:

在新冠肺炎大流行期间,电子评估系统的使用越来越多,尤其是在在线学习中。电子评估提供了许多好处,包括监控学生的进步、提供直接反馈以及支持灵活和适应性的学习。学校的教学实践计划旨在加强教师

教学学生的专业能力。距离和时间、讲师访问的频率、分析组合作业以及没有针对讲师和教师的评估手册是对教师专业能力进行全面评估的障碍。因此，需要一个涉及学生、教师和讲师的综合和整体评估系统。本研究旨在概念性地描述学校学生教学实践项目中基于电子化的教师专业能力测评体系，详细系统地描述测评、电子专业测评、教师专业能力、教学实践理念；提供有关教师专业能力电子评估概念的论文。本研究探讨了与基于电子的教师专业能力评估系统及其实施相关的概念。它们包括理论研究、综合和结论。使用的文献来自书籍和研究期刊。文献研究结果是概念和结论的综合，可用于开发电子教师专业能力评估系统的程序模型和物理模型。这项研究的新颖之处在于技术辅助的基于电子的评估是自动设计的。

关键词：测评、概念模型、电子测评、专业测评、教师专业能力、教学实践。

1. Introduction

The assessment aspect is an important component that cannot be separated from the learning process in the field. Teaching practice assessment plays an important role in determining student teachers' readiness and success in teaching. Field practice is also an important part of teacher education programs because it provides authentic opportunities for student teachers, working with teachers, and teaching supervised by experienced teachers to gain feedback on understanding the realities and complexities of teaching. Field practice is also a prime location to determine the eligibility of student teachers to enter the profession as teachers. Therefore, an effective and efficient assessment system is needed to assess the professional competence of teachers in students through teaching practice in the field. Assessors have a very important role in the learning process. This requires the ability of assessors to plan and carry out quality assignments, interpret evidence and results in accordance with the objectives and types of assessments, and involve students as active participants in their own learning assessments. However, in the study by Mellati and Khademi (2018), most teachers were found not to be good assessors of the quality of their assessment activities and the abilities of their students. Here, the quality of the assessor becomes important because it will determine the achievement of learning objectives. Assessors must be equipped with knowledge and skills, especially in assessing involving technology.

For example, at the Faculty of Education, Pelita Harapan University collaborates with partner schools of Indonesia. The collaboration is held in the teaching practicum program. Several obstacles in the assessment practice result in the assessment goal not being as expected: 1) Distance and time; 2) The frequency of school visitation by field supervisor; 3) Obstacles in analyzing evidence of portfolio assessment. The portfolio is only paper-based documentation, and there are no assessment guidelines for field and teacher supervisors. For this reason, the solution to this problem is to develop an effective and efficient electronic teachers' professional competence assessment system. The first step of this research is to ask one research question: What conceptual model underlies the development of an electronic teachers' professional competence assessment system in teaching practice

programs?

2. Methods

This research uses a literature study to examine concepts related to the electronic teachers' professional competence assessment system and its implementation. This literature study includes theoretical studies, synthesis, and conclusions. The literature used comes from books and research journals. This literature study focuses on answering the research question on the conceptual model underlying the development of an electronic teachers' professional competence assessment system in teaching practice programs. Therefore, this article will produce a theoretical framework that describes and elaborates the concept of an electronic assessment of teachers' professional competence.

3. Results and Discussion

3.1. Professional Concepts in Education

The demand for the professional competence of teachers in carrying out their role is very important in the world of education. The Law on Teachers and Lecturers Number 14 of 2005, Chapter 1, Verse 1 states that teachers are professional educators with the main tasks of educating, teaching, guiding, directing, training, and evaluating students in early childhood education through formal, primary, and secondary education. Therefore, it is important to describe the professional status of teachers referred to in this law.

"Professional" is a term commonly used in various fields, including business, politics, health, and education. Professionalism is an idea that points in many different directions. Two meanings can provide clues about professionalism. The 'profession' refers to a category of job classification, and the 'professional virtue' refers to categorizing technical and ethical standards for certain jobs (Gewirtz et al., 2009). In business, politics, and health, professionalism is a set of characteristics consisting of values, attitudes, and behaviors that put others above oneself. These characteristics include knowledge, code of ethics, personal responsibility, commitment, and service to the profession. Therefore, the research by van de Camp et al. (2004) shows that the conceptualization of professionalism depends on a context. The context from which one tries to conceptualize professionalism is based on its constituent elements that differ in the level

of abstraction, relevance, and importance (van de Camp et al., 2004). In the field of education, much literature attempts to define professionalism, how it is still debated (Bourke et al., 2017). It is even said that the concept of professionalism is complex and can be used in various ways for various purposes (Kennedy et al., 2012). This is because professionalism is a term that accommodates various definitions and can be used descriptively.

Based on the concept of professionalism in business, health, and politics, its characteristics can be linked to education, particularly the elements of interaction, knowledge, and general practice. The concept of teacher professionalism is defined as the responsibility of teachers to control and develop their knowledge and actions for the benefit of clients, in this case, students (Saqipi et al., 2014). Furthermore, professionalism is not only related to special skills but also to an unselfish attitude. In this case, becoming a professional requires readiness, namely having a personal character and behavior of dedication, commitment, and highly professional practice. Weber and Johnsen (2013) explained that the definition of "professionalism" has evolved and includes knowledge of research-based practice, skills in its application, reflective thinking, and producing new knowledge and skills. So, it can be said that a professional is a reflective and productive person.

Based on the explanation of the professional concept above, it can be concluded that professionalism in education is a person's commitment, reflective thinking, and productive action. For gaining these characteristics, prospective teachers and lecturers should be provided with the best through continuous practice in using their special skills following standards for benefiting others. Here, it can be seen that the professional concept has the following main meanings/characteristics:

1. A commitment, reflective thinking, and productive action of a person to give their best and generate new knowledge and skills;
2. The action is carried out continuously using special skills following the specified standards;
3. The purpose of this action is the welfare of others.

Some of the theses of this synthesis are:

- Commitment is a consistent and responsible attitude in carrying out duties as a teacher;
- Reflective thinking, namely the attitude of recognizing one's strengths and weaknesses to act better;
- Productive actions are actions that focus on giving the best and generating new knowledge and skills;
- Continuous practice, namely actions that are focused on goals and consistently carried out;
- Special expertise, namely the knowledge and skills possessed by teachers in the field of education;
- The welfare of others, namely actions taken by teachers, can benefit students' lives.

3.2. Teacher's Professional Competence Concept

In the teacher education bachelor program, students will undergo teaching practices in schools. This program aims to strengthen the professional competence of teachers as an important attribute that every teacher must possess. The quality of a professional is marked by the presence and development of commitment to their excellence, namely continuing to develop their expertise so that others recognize and appreciate it. This is in line with the term "professional," which means daring to accept, acknowledge, and appreciate what is done and carried out (derived from the word 'professor' which means "to admit") (Sidjabat, 2009).

The professional competence of an expert is generally considered a set of abilities, qualities, and personality traits of an individual and the amount of knowledge and experience required to carry out any professional activity. A professional is competent when he acts responsibly and effectively following the given performance standards (Izvorska, 2016). In addition, professional competence is seen as a generic ability, integrated and internalized in professional fields, work, roles, organizational contexts, and specific task situations to provide sustainable (decent) performance, for example, problem-solving abilities, realizing innovation, and creating transformation (Mulder, 2014). On the other hand, the term professional competence is the application of professional concepts to work life, especially in very complex professions with high demands, where mastery of work situations is highly dependent on the interaction of one's knowledge, skills, attitudes, and motivations (Kunter et al., 2013).

A teacher with professional competence has characteristics such as special knowledge, a culture of sharing, and a strong and independent service ethic (Bourke et al., 2017). A professional teacher is committed to students (students become a center of learning), makes wise decisions, is a reflective practitioner, and has professional knowledge. Based on this, it can be said that the professional competence of teachers is the ability to apply knowledge, attitudes, and skills in an integrated and internalized way in working life, commitment to students, decision-making, and responsible reflection practices. Here, it can be concluded that the concept of teachers' professional competence has the following main meanings/characteristics:

- Ability to apply knowledge, attitudes, and skills in an integrated and internalized way;
- Commitment to students, ability to make decisions and practice responsible reflection.

Some of the theses of this synthesis are:

- Knowledge, attitudes, and skills are important attributes of a teacher to be developed;
- Integration and internalization, i.e., several things merge into one and become an inseparable part.

3.3. Educational Assessment Concept

The term assessment is commonly used in education

and is an integral part of teaching that drives learning. In higher education, assessment is an important foundation for education, an essential component of the learning and teaching environment, and the heart of formal higher education. The word "assess" comes from Latin "assidere," which means "to sit beside." In this case, the assessment is a technique used to analyze the achievement of students against certain goals and criteria (Wiggins & McTighe, 2005). Assessment is one of the most emotional words in the educational dictionary. For each person, an appraisal can have different connotations, for example, anxiety, pressure, competition, success, failure, judgment, feedback, fairness, standards, accountability, bureaucracy, and tedious work, depending on the nature of participation in the appraisal (Berry & Adamson, 2011). Assessment can be formative and summative, formal and informal, external and internal, authentic and inauthentic, oral and written, criterion-referenced and norm-referenced, carried out by experts, peers, or oneself; used in evaluating, selecting, determining mastery and leadership, and forecasting (Simonson et al., 2015).

Assessment is a general term that includes a variety of systematic procedures used to obtain and use information about a person's learning, knowledge, attitudes or skills, and decisions or conclusions about the characteristics and learning progress of students. In educational assessments, the collected information can help teachers determine what students know and how well they know for improving future learning outcomes. The educational assessment provides useful feedback to guide individual and collective learning and improve integrated education (Bialik et al., 2016).

Application of assessment in the classroom is a form of feedback on students' progress, and, logically, this feedback will improve learning (Marzano, 2006). In the context of higher education, the assessment provides evidence of credible resources, implementation actions, and outcomes taken to increase the effectiveness of teaching, programs, and services in higher education (Banta & Paloma, 2015). This proves that assessment actions are carried out at all levels of education with various objectives. Assessments carried out in universities receive full attention to all aspects. Correlation between learning, assessment, and decisions has become the main topic to be elaborated on in higher education. The various meanings of assessment presented by experts confirm that assessment gathers information about learning outcomes, including knowledge, attitudes, and skills of students in learning that are not limited by education level. This information can be used in making decisions on student learning outcomes to increase learning effectiveness. Based on all these concepts, it can be concluded that the concept of assessment has the following main meanings/characteristics:

- A process of gathering information about student learning outcomes at all levels of education;
- The information can be used in decision-making to improve learning effectiveness.

Some of the theses of this synthesis are:

- Collecting information about student learning outcomes, namely the process carried out by the teacher to obtain information about students' knowledge, attitudes, and skills obtained in learning;
- Decision-making on student learning outcomes is the process of determining students' success in learning;
- Improving the effectiveness of learning is the goal of the assessment process.

3.4. *Electronic Assessment Concept*

The use of electronic-based assessment systems is growing at the higher education level. Technological developments have led to a shift in concepts and assessing, to moving from face-to-face to digital-based assessments. Assessment lies at the heart of the learning experience, namely how assessment shapes students' understanding of the curriculum and learning and determines their progress. Assessment can drive learning practices anywhere. The presence of technology can play a significant role in this process. If used properly, it can add value to assessment activities (Hettiarachchi et al., 2015).

It is crucial to develop an assessment system that reflects the basic purpose of education and rewards students for developing their skills and attributes that will benefit them and society. The users of this electronic assessment system are the field supervisors (lectures), teacher supervisors, students, and administrators. Therefore, electronic assessment is an option to accommodate the needs of field supervisors and teacher assessment practices to assess teachers' professional competence. Electronic assessment can offer new forms with direct feedback to learners. It is becoming one of the main challenges for schools and higher education today. Therefore, it is becoming increasingly important to build a pedagogically-driven model for electronic assessment that can incorporate electronic assessment and electronic feedback into a holistic dialogic learning framework, recognizing the importance of learner reflection in controlling their learning.

Joint Information Systems Committee (JISC) (2007) defines electronic assessment as an end-to-end electronic assessment process using information and communication technology (ICT) to manage the assessment from the perspectives of students, tutors, educational institutions, award-granting bodies, regulators, and the public. Electronic assessment involves using web-based methods allowing systematic inferences and assessments of students' skills, knowledge, and abilities (Hettiarachchi et al., 2015). Most studies agree that electronic assessment is an assessment in which all assessment procedures from beginning to end are carried out electronically (Alruwais et al., 2018). This means that design, test execution, recording responses, and providing feedback are completed using ICT.

Based on the electronic assessment notions, it can be concluded that electronic assessment is evaluating

students' knowledge and skills using ICT. The assessment procedures include design, implementation, recording responses, and providing feedback that can be seen from the perspectives of students, teachers, lecturers, and tutors. Here, the assessment should focus on transforming students' knowledge based on the obtained results. Based on these concepts, it can be concluded that the concept of electronic assessment has the following main meanings/characteristics:

- Assessment of students using ICT;
- The assessment that can be seen from the perspectives of students, teachers, lecturers, and tutors.

Some of the theses of this synthesis are:

- Assessment is the process of collecting information about student learning outcomes: knowledge, attitudes, and psychomotor skills;
- ICT is a means used to facilitate the delivery of information;
- Students, teachers, lecturers, and tutors are parties who are users of the electronic-based assessment system.

3.5. Teachers' Professional Competence Assessment

Assessment of teachers' professional competence through students' teaching practice in the field is authentic and based on the performance. This form of authentic assessment aims to improve and integrate learners' knowledge and skills (Vu & Dall'Alba, 2014). Authentic assessment has become a key strategy in higher education to provide learners with engaging and meaningful learning experiences in preparation for real-world work environments (Santos & Manuel, 2017).

The scope of teachers' professional competence based on theoretical review essentially includes four components: material mastery competence, pedagogic competence, social competence, and personality competence. They describe the professional competence of holistic teachers and can be divided into two major aspects: intellectual ability (competence in the mastery of material and pedagogics) and the ability to behave (social and personal competence). In this case, being a professional reflects certain standards of knowledge, skills, and professional behavior. That involves dedication, commitment, and responsive behavior to internal and external challenges of the school environment and a network of relationships with students, colleagues, parents, partners, and other agents (Serdenciuc, 2015). Therefore, an assessment of the professional competence of teachers can cover these two aspects: intellectual and behavior. Based on the concepts, aspects, and standards of teachers' professional competence, produce indicators of teachers' professional competence that can be observed and measured according to Bloom's taxonomy to assess student teachers in their teaching practice. These indicators are adapted from the Teacher Performance Assessment document of the Ministry of National Education, 2008. Overall indicators of teachers' professional competence can be seen in Table 1.

Table 1. Indicators of teachers' professional competence

Aspect	Indicator
1. Intellectual ability	
Material mastery competence	<ul style="list-style-type: none"> - Describing the material, concepts, and scientific mindset from various points of view/sources that support the subjects taught; - Explaining the basic competences in the subjects taught; - Developing the subject matter that is taught creatively; - Integrating material that is relevant to the cultural background and daily life of students; - Using information and communication technology for self-development.
Pedagogic competence	<ul style="list-style-type: none"> - Monitoring the characteristics of students from the physical, moral, social, cultural, emotional, and intellectual aspects; - Applying learning theory and teaching principles of learning in the learning process; - Carrying out educational, fun, and innovative learning activities; - Using information and communication technology to maximize educational learning activities; - Designing the learning process for the development of the potential of students in actualizing the various potentials they have; - Communicating effectively, empathically, and politely with students; - Assessing and evaluating learning processes and outcomes, utilizing the results of assessments for learning purposes; - Taking reflective actions to improve the quality of learning.
2. Behavioural ability	
Social competence	<ul style="list-style-type: none"> - Acting objectively and absence of discrimination by gender, religion, race, physical condition, family background, and socioeconomic status; - Communicating effectively, empathically, and politely with fellow educators, education staff, parents, and the community; - Adapting to a school environment with socio-cultural diversity.
Personal competence	<ul style="list-style-type: none"> - Acting following Indonesian national religious, legal, social, and cultural norms; - Demonstrating an honest, committed, noble character, and role model for students and the community; - Showing oneself as a person who is steady, stable, mature, wise, and authoritative; - Demonstrating the work ethic, high responsibility, and self-confidence; - Demonstrating a responsive, responsible, and reflective attitude based on Christian values; - Complying with the code of ethics of the teaching profession.

4. Conclusion

The conceptual model is a synthesis of theories that contain the concepts that underlie the development of an electronic teachers' professional competence

assessment system in teaching practicum programs. These are professional concepts: teachers' professional competence, teaching practice, assessment, and electronic-based assessment. This conceptual model of electronic assessment of teachers' professional competence was developed based on the concepts and principles of assessment involving technology. This conceptual model can be used as a basis for building an electronic teachers' professional competence assessment system. The novelty in this research is that technology-assisted electronic-based assessments are designed automatically.

This research provides a comprehensive insight into ideas and concepts, encourages the development of deeper and broader concepts and theories, is the basis for a new knowledge building in producing output, contributes to providing solutions to the theoretical gaps. The limitation of this literature study is that there are obstacles to accessing literature relevant to the topic. So, it is necessary first to design the theoretical framework, describe it, and integrate the concepts based on that framework. Furthermore, procedural and physical models of the electronic teachers' professional competence assessment system can be developed.

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