Salud, Ciencia y Tecnología - Serie de Conferencias. 2024; 3:.996
doi: 10.56294/sctconf2024.996

Category: Education, Teaching, Learning and Assessment

ORIGINAL

Pedagogic Competence of Lecturers with Non-Educational Backgrounds in the Challenges of 21st Century Learning

La competencia pedagógica de los docentes de formación no docente ante los retos del aprendizaje del siglo XXI

Viviana Mayasari[1], Devani Laksmi Indyastuti[1], Daryono[1]

[1]Universitas Jenderal Soedirman, Faculty of Economics and Business. Purwokerto, Indonesia.

Cite as: Mayasari V, Indyastuti DL, Daryono D. Pedagogic Competence of Lecturers with Non-Educational Backgrounds in the Challenges of 21st Century Learning. Salud, Ciencia y Tecnología - Serie de Conferencias. 2024; 3:.996. https://doi.org/10.56294/sctconf2024.996

Submitted: 07-02-2024 **Revised:** 03-05-2024 **Accepted:** 18-08-2024 **Published:** 19-08-2024

Editor: Dr. William Castillo-González

ABSTRACT

Learning in the 21st century requires lecturers and students to think critically, creatively innovatively, have communication skills, collaborate and use of ICT. The pedagogical competence of lecturers is the key to educational efficiency in improving the quality of learning and the quality of graduates. The background of lecturers from non-education increasingly casts doubt on the quality of lecturer teaching in challenging 21st-century learning activities. This study aims to identify, describe, and analyze how the application and efforts to develop the pedagogical competence of non-educational lecturers in learning in 4 public and private universities in Banyumas Regency. This descriptive qualitative research uses observation and interview methods on 20 respondents taken *purposively* at four universities in Banyumas Regency. The process of collecting and analyzing information data uses qualitative research data analysis steps developed by Miles & Huberman (1992), namely (1) data reduction, (2) data presentation and (3) conclusions. The results showed how pedagogic competence possessed by lecturers with non-educational backgrounds, how it is applied in learning, how lecturers' efforts in developing their pedagogic competence, how universities facilitate pedagogic development, and the challenges faced by lecturers with non-educational backgrounds in developing pedagogic competence in supporting 21st-century learning.

Keywords: Pedagogic Competence; Non-Educational Lecturer; Development; College; 21st Century Learning.

RESUMEN

El aprendizaje en el siglo XXI requiere que los profesores y los estudiantes piensen de forma crítica, creativa e innovadora, tengan habilidades de comunicación, colaboren y utilicen las TIC. La competencia pedagógica de los profesores es la clave de la eficiencia educativa para mejorar la calidad del aprendizaje y la calidad de los graduados. El origen de los profesores no educativos genera cada vez más dudas sobre la calidad de la enseñanza de los profesores en las desafiantes actividades de aprendizaje del siglo XXI. Este estudio tiene como objetivo identificar, describir y analizar cómo se aplican y se realizan esfuerzos para desarrollar la competencia pedagógica de los profesores no educativos en el aprendizaje en cuatro universidades públicas y privadas en Banyumas Regency. Esta investigación cualitativa descriptiva utiliza métodos de observación y entrevistas a 20 encuestados seleccionados intencionalmente en cuatro universidades en Banyumas Regency. El proceso de recopilación y análisis de datos de información utiliza los pasos de análisis de datos de investigación cualitativa desarrollados por Miles y Huberman (1992), a saber, (1) reducción de datos, (2) presentación de datos y (3) conclusiones. Los resultados mostraron cómo la competencia pedagógica que poseen los docentes con antecedentes no educativos se aplica en el aprendizaje, cómo los esfuerzos de los docentes para desarrollar su competencia pedagógica, cómo las universidades facilitan el desarrollo

pedagógico y los desafíos que enfrentan los docentes con antecedentes no educativos para desarrollar la competencia pedagógica en apoyo del aprendizaje del siglo XXI.

Palabras clave: Competencia Pedagógica; Docente no Docente; Desarrollo; Universidad; Aprendizaje del Siglo XXI.

INTRODUCTION

The National Education System aims to produce generations as quality human resources. For this reason, it is necessary to involve all interrelated and integrated education components to realize the educational goals set nationally (Munawarah, 2018). The process of teaching and learning activities which include teaching and learning activities, educating students, and interaction between teachers and students as an active reciprocal relationship is important in the world of education (Adawiyah, 2019).

Higher education requires good lecturers in teaching and other educational activities. Quality teaching requires teachers to have a professional attitude towards their role in learning (Apelgren &; Giertz, 2010). Lecturers as the first profession that gave birth to thousands of other professions, became the vanguard in advancing the nation. For this reason, the quality of teachers greatly determines the progress of a nation and country (Ruang Guru, 2017). This is in accordance with Law of the Republic of Indonesia Number 14 of 2005 concerning Teachers and Lecturers, where the government recognizes teachers / lecturers as professional educators with the main task of educating, teaching, guiding, directing, training, assessing and evaluating students in early childhood education, primary education, secondary education and other formal education. The implication is that lecturers must have an educator certificate to be recognized as professional lecturers.

Lecturers as professionals can only be done by someone who has academic qualifications, competencies, and educator certificates in accordance with the requirements for each type and level of education. Law of the Republic of Indonesia Number 14 of 2005 concerning Teachers and Lecturers Article 10 paragraph (1) mandates that lecturers and teachers must have pedagogic competence, personality competence, social competence, and professional competence. These four competencies are comprehensive and become a unity which characterizes professional lecturers. The provision of quality education service guarantees requires adjustments to learning in accordance with the demands of the times so that efforts are needed to improve the competence of lecturers on an ongoing basis. Of the four competencies that must be mastered by lecturers, one of them is pedagogic competence which requires the ability to understand the participation of students in depth and the implementation of educational learning. Pedagogic competence is important because the understanding of students includes an understanding of the psychology of student development, while educational learning includes the ability of lecturers to design learning, carry out learning, assess learning processes and outcomes and make continuous improvements (Samusevica &; Striguna, 2017).

The concept of pedagogic competence is used as a minimum professional standard, where it is a minimum requirement for a lecturer with integrated features that describe the ability to solve pedagogic problems and pedagogic implementation in real-time by applying knowledge, professional and life experiences, values and talents creatively so that the right concept of competence is obtained and the results are effective (Gliga, 2002). Pedagogic competence is the key to efficient education (Irina &; Liliana, 2011).

Learning in educational institutions needs to adjust to the times. Entering the 21st century, educators and students are required to have appropriate characters where students as the next generation have skills and independence in the 21st century (Sukmana, 2023). Learning methods in past generations demanded how learners were able to obtain information. The lecturers' teaching method is carried out lectures by lecturing, dictating, asking, giving notes where students only receive information by taking notes, listening, and listening. Old Generation "Yesterday: Student Relationship with Information Challenge: How to Get Information". In the 21st century learning there needs to be more active, creative and innovative teaching methods. Generation Now "Today: Student Relationship with Information Challenge: How to Filter Information" (Batelle for Kids, 2019). In 21st-century learning, there are three skills that need to be developed in learning. These skills are: (1) learning and innovation skills; (2) information, media and technology skills; and (3) life and career skills (Destiana &; Utami, 2017). In addition, there are four pillars of education recommended by UNESCO, namely learning to know, learning to do, learning to be, and learning to live together in peace (Priscilla &; Yudhyarta, 2021).

The success of students in mastering skills in the 21st century is determined by the quality of educators in teaching (Erdem et al., 2019). Pedagogic competence should be developed over time. For this reason, lecturers need to understand pedagogic competence in the 21st century in accordance with the progress of the times, where the era is all online and digital, education must immediately transform towards the use of technology

(Noss, 2012; Ananiadou & Claro, 2009). Learners need a new set of skills to make their way around in a complex and constantly evolving future (Craig, 2012). Learning activities in the 21st century are supported by e-learning (learning with a computer), m-learning (learning with a mobile device), and u-learning (learning with the internet network) (Grail Research, 2011). This is an effort by universities to produce quality and competitive graduates in accordance with national standards and international standards. Graduates must master hard skills and soft skills so that they can compete for jobs at the local, national, and global levels (Rahman, Mutiani &; Putra, 2019).

This shows that pedagogic competence has a holistic nature, including the ability of lecturers in various aspects of learning that must be developed in line with the times, such as technological advances, scientific revolutions, and others. The pedagogical competence of lecturers is expected to be able to solve problems in learning activities in the classroom. However, problems often occur in the classroom from both lecturers and students, namely that the background of lecturers comes from non-education, the ability of lecturers to plan and implement learning is still less effective, the learning methods carried out by lecturers are less varied, learning materials are still lacking, learning media are underutilized, the low ability of lecturers in Information and Communication Technology (ICT) skills, Lack of active students in discussions, limited students in critical thinking, there are still students who are late for class and collect assignments. From these problems, this research needs to be conducted to analyze the pedagogical competence of lecturers with non-educational backgrounds towards learning in the 21st century which is full of competition and challenges in utilizing technology.

Literature Review

Pedagogical Competence

Pedagogical competence according to (Giertz, 2003: 94) is described as the ability and willingness of lecturers to consistently apply attitudes, knowledge, and skills that encourage student learning. According to Susanto, et al. (2020), pedagogic competence is the main requirement to carry out the profession as an educator. Pedagogic competence is an ability related to understanding student characteristics, mastery of learning theories and principles, curriculum development, learning activities, developing student potential, communication skills with students, and assessment and evaluation skills. The embodiment of pedagogic competence is the profile of actions identifying student learning characteristics, guaranteeing students' opportunities to actively participate, organizing classes for various characteristics, knowing the causes of deviations in learning behavior, developing potential and deficiencies, and humanist action (Liakopoulou, 2011). From some of these definitions, pedagogic competence implies that lecturers, based on defined goals and frameworks, through pedagogic development and personal professional development, provide the best support and facilitate student learning. This pedagogic competence also reflects the capacity of lecturers to collaborate, having a comprehensive vision, and contribute to the pedagogic development of higher education (Ryegard, 2008: 9).

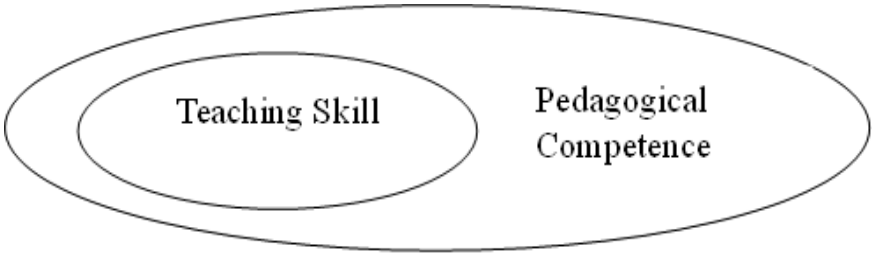

Figure 1. Teaching Skills and Pedagogic Competence (Ryegard et al., 2010)

Theoretical skills in higher education pedagogics and knowledge of the activities of the teaching process are essential for the teaching and learning perspective of lecturers. Pedagogic competence is supported by knowledge of teaching and learning so that pedagogic theory and practice together develop an understanding of teaching that becomes the foundation for continuous development (Olsson et al., 2010). Pedagogic competence is the key to efficient education (Irina &; Liliana, 2011). The concept of pedagogic competence is used as a minimum professional standard, often prescribed by legislation. Pedagogic competence is a minimum requirement for the integration ability of a person who is a teacher or lecturer in describing the ability to solve pedagogical problems and pedagogical tasks that occur in situations of real pedagogical activity by applying knowledge, professional and life experiences, values and talents creatively so that they are obtained appropriately and the results are effective (Gliga, 2002).

https://doi.org/10.56294/sctconf2024.996

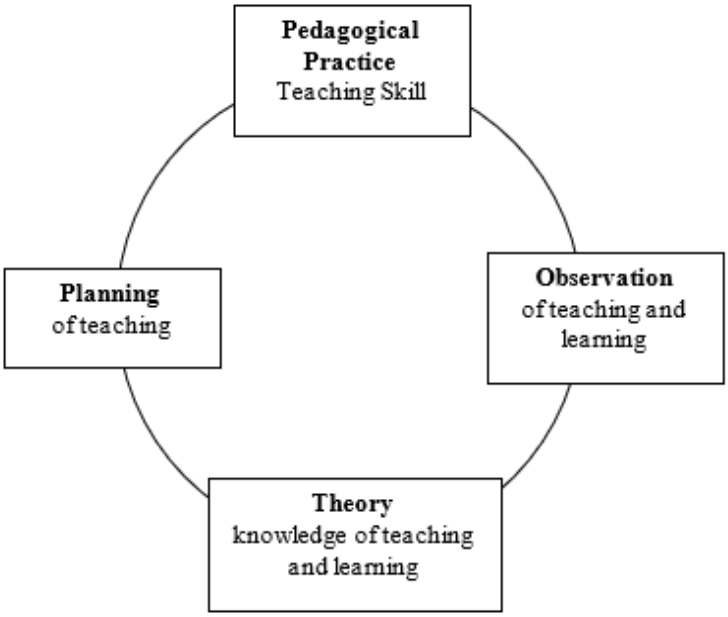

Figure 2. Pedagogic Competency Model (Olsson, Marteson &; Roxa, 2008)

The elements of pedagogic competence according to Claire Rees, et.al. (2007) including: understanding knowledge and research results related to learning; understand the different characteristics in learning; understand the education system; understand interactions in education; analyze and develop learning abilities; have new ideas related to globalization in the education system; understand the concepts and theories encountered while learning; and using Information and Communication Technology (ICT).

21st Century Learning

Learning is central in society and a knowledge-based economy. In many countries, there is a push to reflect this by ensuring that education system reforms focus more on learning itself rather than simply changing the structure and organization of education. 21st-century skills argue that these skills cannot be taught independently, and students cannot apply these skills without proper factual knowledge; that's why they demand an emphasis on content, and a broad liberal arts curriculum (Ananiadou &; Claro, 2009). Skills and knowledge are inseparable. Research also reveals that learning is done best when skills and knowledge are combined (Silva, 2009).

Thrilling and Fadel (2009:26) posit three categories of 21st-century skills, which are outlined as follows: learning and innovation skills (critical thinking and problem solving, communication and collaboration, creativity and innovation); digital literacy skills (information literacy, media literacy, ICT literacy); and career and life skills (flexibility and adaptability, initiative and self-direction, social and cross-cultural interaction, productivity and accountability, leadership and responsibility). Digital and the internet are physical components that support the formation of education in the 21st century which makes it easy for students to find sources of information widely and deeply. Digital and the internet are cutting-edge and sophisticated technologies and are very effective when used by students to learn. In addition, campus residents need to have global awareness, so that humans as the main driving element of education must have advanced thinking and technological literacy. The next aspect of information, in this case, is related to the ease of school residents in obtaining factual information. In the learning process, students are given the convenience of being able to access information quickly and easily, especially important information and related to the learning material.

Figure 3 shows the relationship of various elements in the 21st Century Learning Framework (P21) in the teaching and learning process in the 21st century. Batelle for Kids (2019) suggests that P21 describes the skills, knowledge and expertise that students must master in order to succeed in work and life. It is a combination of knowledge, specific skills, expertise and literacy. Any application of 21st century skills requires the development of material knowledge and understanding in all students, such as critical thinking and effective communication, to build an important foundation of academic knowledge. In the context of teaching, students must learn essential skills to be successful in today's world, such as critical thinking, problem-solving, communication, and collaboration. It is expected that as educational institutions build on this foundation, combining the entire Framework with the necessary support systems, including standards, assessment, curriculum and teaching, as

https://doi.org/10.56294/sctconf2024.996

well as professional development and learning environments, students involved in this learning process will become graduates better prepared to face today's global economy.

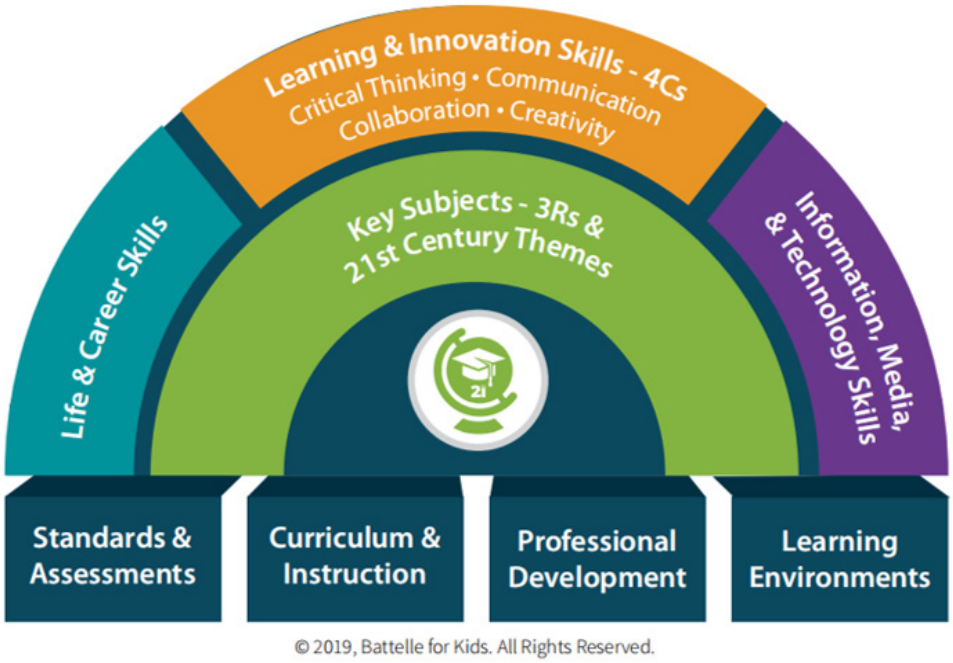

Figure 3. The Relationship of 21st Century Learning Components (P21) in the 21st Century Teaching and Learning Process (Batelle for Kids, 2019)

Pedagogic Competence in 21st Century Learning and Its Development

Teaching knowledge means that every teacher must have a variety of skills and knowledge related to teaching pedagogy. In teaching, students need to feel that their lecturers are more qualified and master the material with learning methods and strategies that are in accordance with student thinking. Lecturers should use different methods such as cooperative learning, mastery learning, contextual learning and collaboration. 21st-century learning makes lecturers act as facilitators to develop students' cognitive abilities by encouraging students to actively participate in class and guiding them through every learning activity (Rivin et al., 2019). In addition, 21st century teaching skills must be accompanied by mastery of information and communication technology (ICT). Lecturers as agents of change play a very important role in actively involving students in digital literacy by searching for relevant material on the Internet, YouTube, or other educational sites (Kiamsin &; Talin, 2018).

Teaching techniques and strategies are also important aspects of educators' efforts to implement learning in the 21st century. Teaching techniques are skills that must be mastered by educators to convey teaching and learning content including the application of appropriate learning teaching methods, such as: stories, lectures, discussions, demonstrations, practical exercises, brainstorming and games. The purpose of using different teaching techniques in learning is to arouse students' curiosity and interest to achieve teaching and learning goals. While the teaching strategy aims to identify student interests and monitor the progress of student understanding during the teaching and learning process based on their cognitive level in understanding the topic discussed. Understanding different students requires teaching strategies such as teacher-centered, student-centered, or material-based (Rivin et al., 2019).

Mc Celland (1973) states that competence and how to build a competency model in an organization become very fundamental compared to building an intellect that has an impact on effectiveness and superior performance. The pedagogic competency development model based on pedagogic knowledge with the concept of educational philosophy provides the basis that teachers should have the Concept of Knowledge, the Ability to Apply Rules, and Have an Attitude to: 1. Focus on Education and the Subject of Education Humans who think about education, and at the same time humans become the subject of Education, 2. Focus on Value Development Education needs to think and consider better values and ideals, 3. Focus on Externalizing Values Education or educating is an effort to realize values and ideals in human life and personality, 4. Development of Human Logical Analysis in analyzing adhering to the ability of reason, experience, intuition and reflective (Susanto et al., 2021). Building a competency model according to Susanto et al. is to build a knowledge, skills, self-concept, character and motives for developing pedagogic competence of teachers for example; through training, seminars, workshops, courses, small group discussions, comparative studies, tutorials, and coaching.

https://doi.org/10.56294/sctconf2024.996

METHOD

Research Design

This research adopts a qualitative research method with a descriptive approach. Qualitative methods are often referred to as natural research methods because research is conducted in natural conditions (Sugiyono, 2021: 24). Qualitative methods are defined as "social science research methods that collect and analyze data in the form of human words and actions, without calculating qualitative data, and without analyzing numbers" (Afrizal, 2016: 13).

According to Sukmadinata (2011: 73), descriptive qualitative research aims to "describe existing phenomena, both natural and artificial, by paying more attention to the characteristics, quality, and relationships between activities." In addition, descriptive research does not propose "how to manage, manipulate, or modify the variables under study, but only explains the conditions as they are." In this case, researchers interpret and explain the data obtained from interviews, observations, and documentation to "obtain detailed and clear answers to the problems."

Participants

This research involved 20 lecturers with non-education backgrounds from 4 universities in Banyumas Regency, namely Jenderal Soedirman University, Prof. K. H. Saifuddin Zuhri State Islamic University Purwokerto, Muhammadiyah Purwokerto University, and Wijaya Kusuma University Purwokerto. Data were obtained from observations, interviews, and documentation in the field, then analyzed and described in narrative form.

Data Collection

The research instruments involved questionnaires, interviews, and various references and literature reviews. Prior to the study, initial observations were made by administering questionnaires to non-education lecturers to identify information related to respondents' age, educational background, previous work experience, and how long they have been teaching.

After observation, interviews were conducted with respondents to obtain information about the application of pedagogical competencies possessed by non-education lecturers in the implementation of 21st century learning values, find out the difficulties and challenges experienced by respondents in teaching, respondents' experience in attending formal training on pedagogics, and what efforts were made by respondents in developing their pedagogical competencies.

Data Analysis

Data obtained from observations, interviews, and documentation in the field were then analyzed and described in narrative form. The analysis was conducted after the data collection process in the field was completed. The process of data collection and analysis followed the steps of qualitative research data analysis developed by Miles & Huberman (1992: 16), namely (1) data reduction, (2) data presentation, and (3) conclusion.

RESULT AND DISCUSSION

The results of the questionnaire pedagogic competence of lecturers with non-educational backgrounds in the challenges of 21st-century learning answers respondent provide various information about the respondent's picture of the respondent's age, educational background, teaching time and previous work experience.

Table 1. Results of age, education, length of teaching and work experience categories

Indicators	Category	Sum	Percentage
Age	25-30 years	2	10 %
	31-40 years	10	50 %
	41-50 years	5	25 %
	51-60 years	3	15 %
Education	Doctor	7	35 %
	Magister	13	65 %
Teaching Duration	0-5 years	8	40 %
	6-10 years	5	25 %
	11-15 years	4	20 %
	16-20 years	3	15 %
Work Experience Before Teaching	Private Company	4	20 %
	State-owned companies	3	15 %
	Other educational institutions	4	20 %
	Never worked	9	45 %

https://doi.org/10.56294/sctconf2024.996

Respondents were non-education lecturers consisting of 15 % or 3 people with the age category of 51-60 years, 25 % or 5 people with the age category of 41-50 years, and 60 % or 12 people with the age category of 31-40 years. The last education taken by respondents was 35 % or 7 people with doctoral education and the remaining 65 % or 13 people with master education. The average length of teaching as a lecturer is 8 people or 40 % have taught for 0-5 years, 5 people or 25 % have taught for 9-10 years, 4 people or 20 % have taught for 11-15 years and 3 people or 15 % have taught for 16-20 years. Previous work experience varies such as having worked in private companies, state-owned companies, other educational institutions and having never worked before.

Application of Pedagogic Competence of Non-Educational Lecturers in Learning in the 21st Century

Researchers used pedagogic competency criteria adopted from Assessing Teaching Skills, UPI, Uppsala University (2010) in making questions in interviews to provide evidence of the extent to which non-educational lecturers have pedagogic competence. These criteria consist of the ability to understand the characteristics of students, have teaching knowledge, plan and design learning with a scientific approach, increase knowledge broadly, develop student potential, make continuous improvements, and involvement of leaders and organizations. Interviews conducted with respondents related to pedagogic competence possessed by non-educational lecturers had almost the same response. Lecturers who do not have formal education knowledge are still required to have good pedagogic competence to be effective teachers.

Mastery of the characteristics of learners is the first criterion of pedagogic competence that must be mastered by every lecturer. Based on the results of interviews with non-educational lecturers, the characteristics of students have various characteristics, there are students who are active, shy, carefree, cannot calm down, like to disturb their friends, and so on. The diversity of student characteristics is in line with Suntoro (2021) which states that there are differences in the characteristics of one student with the characteristics of other students. One way to understand the characteristics of students, lecturers need to pay attention to and analyze the attitudes, behaviors, speech of students through direct observation or observation of student habits in the learning process (Irwantoro &; Suryana, 2016). The interview results showed that there were 40 % or 8 respondents who observed the characteristics of students and 60 % or 12 respondents did not observe the characteristics of their students. This is because of the limitations of lecturers in observing all students and lecturers are more focused on learning both material delivery and discussion. However, lecturers always remind students not to do excessive behavior such as talking and laughing too loudly, joking excessively and being nosy during learning activities.

To see the potential of students, lecturers usually give assignments both individual assignments and group assignments. From the assignment, it can be a reference for lecturers to provide guidance for students and make improvements. The interview results showed that 100 % or all respondents gave course assignments to students either individual assignments and or group assignments. This is done to get the task value component which will later be processed with other value components. In addition, in understanding the characteristics of students in class, lecturers ensure that all students get equal opportunities during discussion activities so that there is equal opportunity among students to get scores from active points. From the interviews, 70 % or 14 respondents did equal opportunities to students and 30 % or 6 respondents did not equalize equal opportunities to students. This is because of the differences in teaching methods carried out by each respondent, there are respondents who apply equal distribution of activeness and some who let learning run naturally.

The next criterion is that lecturers need to master various learning theories and learning principles that support learning. It is used to plan and design the best teaching for student learning. For this reason, lecturers need the right learning techniques and strategies so that students can understand the material presented. However, non-education lecturers have limited knowledge and knowledge of learning theories and principles. This is because the background of lecturers comes from non-educational study programs so they do not get courses related to the basic sciences of education. The interview results showed that respondents had different teaching styles. The efforts made by respondents are to carry out varied learning activities. Lecturers vary teaching styles on the use of language style, intonation and emphasis when speaking, eye contact when teaching and changing positions in teaching in class. In addition, the use of learning methods and media also varies from conventional methods of lectures, two-way active discussions, creating study groups, and so on.

Efforts to increase knowledge in educational sciences, especially teaching skills, have been carried out by most respondents (80 %, 16 respondents). Some of the ways respondents do are learning independently, participating in various trainings, discussing with experienced senior lecturers, and sharing knowledge with colleagues. These efforts are felt to benefit respondents' understanding of teaching skills related to varied approaches, strategies, methods, models and learning media that can be applied in classroom learning.

The next criterion relates to learning design through the preparation of a Semester Learning Plan (RPS). Lecturers carry out learning planning by compiling RPS for each course for one semester. The interview results showed that 80 % or 16 respondents had compiled RPS for each course as a teaching guideline and the remaining

https://doi.org/10.56294/sctconf2024.996

20 % or 4 respondents did not compile RPS in each course, only compiled a short syllabus or relied on the preparation of RPS by teaching partners. The preparation of RPS functions to connect material with one another so that the learning outcomes of the courses that have been determined are realized. RPS contains course learning outcomes that aim to create values of attitudes, knowledge, special skills, and general skills for students. Lecturers must be able to compile and implement complete educational learning planning, carry out learning according to student needs, teach according to established learning outcomes, use relevant learning resources and according to student characteristics, utilize ICT in learning (Irwantoro &; Suryana, 2016) and evaluate learning through assessment of assignments, midterm exams and final semester exams. 21st century teaching skills must be accompanied by mastery of information and communication technology (ICT). Lecturers as agents of change play a very important role in actively involving students in digital literacy by searching for relevant material on the Internet, YouTube, or other educational sites (Kiamsin &; Talin, 2018).

The next criterion is to develop the potential of students. Respondents develop student potential through providing motivation from lecturers to students. All lecturers or 100 % of respondents always motivate students to encourage creativity, be able to think critically, solve problems comprehensively, and communicate well. Lecturers involve students to be active in learning so that the classroom atmosphere becomes lively and students are not bored and sleepy. Students are given the opportunity to ask questions and opinions from their point of view and perception in responding to a discussion. This is in accordance with student skills in learning in the 21st century where students must be able to think critically and find solutions to every problem. In addition, respondents said it was necessary to establish communication between lecturers and students. Learning activities are mostly carried out with communication, both unidirectional communication and two-way communication. Communication between lecturers and students must be carried out effectively and with full of politeness. This can be done when lecturers ask questions in good and polite language, to find out the progress of learning and student understanding of the material that has been delivered. On the other hand, lecturers need to respond to student answers by giving appreciation to students who answer correctly and giving advice to students who have not been able to answer lecturers' questions correctly.

For a lecturer, mastering pedagogic competence well will certainly affect optimal learning outcomes (Rahman, 2019). Pedagogic competence describes how a lecturer carries out learning well, mastering student characteristics, mastering learning theories and learning principles, curriculum development, developing student potential, communicating well with students and being able to use evaluation results to improve the quality of learning. Thus, the better the pedagogic competence of a lecturer, the better the quality of learning and of course it will also improve the performance of lecturers.

Challenges and Efforts of Non-Education Lecturers in Developing Pedagogic Competencies in 21st Century Learning

The limited pedagogic knowledge possessed by non-educational lecturers is certainly a challenge. Pedagogical Competencies of Lecturers with Non-Educational Backgrounds in the Challenges of 21st Century Learning involving 20 lecturers with non-educational backgrounds from 4 universities in Banyumas Regency realize if they do not have enough knowledge about learning theories and effective teaching strategies. This, of course, can have an impact on ineffective learning practices. Efforts that can be made are conducting training and professional development in the pedagogic field, collaborating with education lecturers who understand pedagogy to get guidance, guidance and support, as well as reading literature on education and attending online courses or seminars on pedagogics.

As many as 75 % or 15 respondents said they taught in pairs with team teaching with senior lecturers in each course for one semester and the remaining 25 % or 5 respondents taught themselves in certain courses in one semester. The team teaching system has a positive impact on respondents. This is one of the opportunities for respondents to benefit from senior lecturers. Senior lecturers provide input in choosing the right teaching methods and learning models, compiling and managing the effectiveness of RPS preparation, developing learning materials, giving advice and motivation to respondents to continue to develop their pedagogic skills, and participating in assessing and evaluating the performance of teaching partners to find problems, find solutions and make improvements. This collaboration in team teaching will result in an extraordinary lecture process in improving the quality of higher education (Wiradinata, 2013).

21st century learning is required to involve the use of technology in supporting learning activities. The use of technology must be done in an attractive, efficient and accountable manner to improve the learner experience (Khahro &; Javed, 2022). Most non-education lecturers have applied technology in learning and some lecturers with age criteria of 45 years and over have limitations to use technology-based learning tools. In the 21st century, many applications and platforms are used to support learning, for example, Canva (making powerpoints and posters), Quizziz (making online quizzes), KineMaster (making Learning Videos), Google Classroom (creating digital classes), Prezi (making frame-based presentations), Microsoft Powerpoint (making presentations and visual video recordings) and so on (Shoffa et al., 2021; Kartiwi &; Rostikawati, 2022). There are 60 % or 12

respondents who have used several applications at once to support classroom learning such as Canva, Quizziz, Google Classroom and Microsoft Powerpoint and as many as 40 % or 8 respondents only use Microsoft Powerpoint to support learning. This shows that respondents have not maximized in using applications and platforms in supporting classroom learning. Efforts that can be made are willing to learn relevant technology tools and platforms for learning, attend training on the use of technology in learning and invite technology practitioners facilitated by their respective campuses. More than half of the respondents (55 %, 11 respondents) said they had learned independently in operating various applications and learning support platforms. Respondents also find out which applications and learning platforms are in accordance with the courses they teach.

The education curriculum in Indonesia changes frequently. Curriculum changes are a challenge for respondents in adjusting effective learning strategies and techniques. Curriculum changes need to be done systematically and purposefully. This happens because of the changes and demands of the times that make universities have to make adjustments to the sciences given to students to be relevant to the changes and developments of the times (Rawung et al., 2021). Summary of interviews with respondents obtained several ways respondents do in dealing with curriculum changes in the 21st century, starting with applying an open attitude and accepting changes that occur, followed by asking for student involvement in developing course materials that are relevant to the 21st century era and collaborating with the curriculum team to understand changes in the curriculum.

The next challenge is the different characteristics of students, both nature, attitudes, backgrounds, learning styles and learning needs. Respondents must think using the right learning strategies and techniques so that learning can run effectively. The efforts made by respondents were to analyze student differences in class and conduct trial techniques for learning methods that suit students. Learning is carried out actively and students have the opportunity to be involved in giving input ideas and thoughts from their point of view. Lecturers do not forget to give a good response with applause, congratulations, advice, and other forms of appreciation as a form of motivation and increase student enthusiasm in active learning.

Next, study evaluation to measure student progress and achievement. Evaluation is a measuring tool or process to determine the level of success that students have achieved on teaching materials or materials that have been delivered, so that with the evaluation, the objectives of learning will be seen accurately and convincingly. Evaluation does not only rely on assessing learning outcomes, but also needs to assess inputs, processes, and outputs (Idrus, 2019). The national education system uses the classification of learning outcomes from Benjamin S. Bloom, better known as Bloom's Taxonomy, which broadly divides it into three domains, namely cognitive, affective and psychomotor (Sudjana, 2011). Learning evaluation is a challenge for respondents because they do not have a basis in education, especially learning evaluation. Respondents said that learning evaluation techniques are carried out now without knowledge of how to conduct good and appropriate educational assessments. 60 % or 12 respondents said they had assessed student progress regularly, and the remaining 40 % or 8 respondents rarely rated student progress in learning activities. The current evaluation of learning conducted by respondents is limited to providing practice questions, individual assignments, group assignments, quizzes, midterm exams and end-of-semester exams. A simple effort that respondents can do is to provide an assessment with the provisions of the assessment composition that has been determined in the RPS, such as components of assignments, projects, exams, and reflections.

One of the pedagogic competency criteria of Assessing Teaching Skills, UPI, Uppsala University (2010) is "striving for continuous improvement". Non-education lecturers who were respondents in this study had awareness of the limited ownership of knowledge in educational sciences, especially pedagogic skills. This is what makes lecturers continue to improve their pedagogic competence skills continuously in various ways. The last criterion is "leadership and organisational ability", the educational institution where respondents work needs to provide facilities for improving pedagogic competence. However, 50 % or 10 respondents said not all institutions provide such facilities. Even if there is, it is only given once a semester or even once a year with a limited number of participants. However, respondents assessed that educational institutions have contributed to improving the competence of lecturers, namely providing seminar and training information, motivating lecturers to conduct further studies, and facilitating financing in improving the competence and professionalism of lecturers.

Learning in the increasingly complex 21st century, lecturers and students are required to have three categories of 21st century skills, namely learning and innovation skills (critical thinking and problem solving, communication and collaboration, creativity and innovation); digital literacy skills (information literacy, media literacy, ICT literacy); and career and life skills (flexibility and adaptability, initiative and self-direction, social and cross-cultural interaction, productivity and accountability, leadership and responsibility). Of course, the role of lecturers is very important in developing students' abilities to be able to master the three skills in the 21st century. Summarized from the results of interviews with respondents, it was obtained that there were several ways that respondents did to improve pedagogic competence, namely learning independently, attending various seminars and trainings, learning from experienced senior lecturers, and development facilitated by the educational institutions of each respondent.

https://doi.org/10.56294/sctconf2024.996

CONCLUSIONS

This research was conducted to find out how pedagogic competence is possessed by lecturers with non-educational backgrounds, how it is applied in learning, how lecturers' efforts in developing their pedagogic competence, how universities facilitate pedagogic development, and challenges faced by lecturers with non-educational backgrounds in developing pedagogic competence in supporting 21st century learning. Based on the results of extracting information using pedagogic competency criteria adopted from Assessing Teaching Skills, UPI, Uppsala University (2010), respondents who are lecturers without formal education knowledge, are still required to have good pedagogic competence to become effective teachers. Respondents need to have the ability to understand the characteristics of learners; have teaching knowledge related to learning approaches, techniques, methods and strategies; able to plan and design learning with a scientific approach through RPS; increase knowledge widely through independent study, attending various trainings, discussing with experienced senior lecturers, and sharing knowledge with peers; developing the potential of students through providing motivation and appreciation, making continuous improvements through various means, as well as the involvement of leaders and organizations to contribute to improving lecturer competence.

REFERENCES

1. Adawiyah, R. (2019). Peningkatan Hasil Belajar Pendidikan Agama Islam Mahasiswa Melalui Kompetensi Profesional Dosen Dan Minat Belajar Mahasiswa. Andragogi: Jurnal Pendidikan Islam, Volume 1, Nomor 1.

2. Afrizal. (2016). Metode Penelitian Kualitatif: Sebuah Upaya Mendukung Penggunaan Penelitian Kualitatif dalam Berbagai Disiplin Ilmu. Jakarta: Rajawali Pers.

3. Akgunduz, D., Ertepinar, H., Ger, A. M., Kaplan Sayi, A., Turk, Z. (2015b). STEM egitimi calistay raporu: Turkiye STEM egitimi uzerine kapsamli bir degerlendirme. [The report of STEM education workshop: An assessment on STEM education in Turkey] [White Paper]. Istanbul Aydin University STEM Merkezi ve Egitim Fakultesi.

4. Ananiadou, K., & Claro, M. (2009). 21st Century Skills and Competences for New Millennium Learners in OECD Countries. OECD Education Working Papers, No. 41. Paris: OECD Publishing.

5. Apelgren, K. and Giertz, B. (2010). Pedagogical Competence – A Key To Pedagogical Development And Quality In Higher Education. Uppsala University Division for Development of Teaching and Learning : Swedia

6. Batelle for Kids. (2019). Framework for 21st Century Learning Definitions. Partnership for 21st Century Learning. A Network of Batelle for Kids.

7. Bogdan dan Taylor. (1975). Metodologi Penelitian Kualitatif. Bandung: Remadja Karya.

8. Claire Rees, et.al. (2007). Student employability profiles: a guide for higher education practitioners. New York: The higher Education Academy.

9. Craig, J. (2012). 6 Steps to Implement 21st Century Skills. 16.

10. Destiana, B. & Utami, P. (2017). The urgency of vocational teachers' pedagogical competence in learning 21 century. Elinvo (Electronics, Informatics, and Vocational Education), Volume 2, Nomor 2.

11. Erdem, C. (2019). Introduction to 21st century skills and education. Book Chapter One. https://www.researchgate.net/publication/336148206

12. Erdem, C., Bagci, H. & Kocyigit, M. (2019). 21st Century Skills and Education. Cambridge Scholars Publishing : UK.

13. Giertz, B. (2003). Att bedoma pedagogisk skicklighet - gar det? Uppsala: Rapportserie från Avdelningen for utveckling av pedagogik och interaktivt larande, Uppsala univ. UPI:2.

14. Gliga, L. (coord.) (2002). Standarde Profesionale Pentru Profesia Didactică. "ucureştiDZ M.E.C.

15. Grail Research. (2011). Consumers of Tomorrow, Insights and Observations About Generation Z, a division of Integreon.

https://doi.org/10.56294/sctconf2024.996

16. Herianingtyas, N. L. R. (2017). Mewujudkan 21St Century Learning Berbasis Karakter Melalui Implementasi Taxonomy For Science Education Di Sekolah. Seminar Nasional Pendidikan Sains II UKSW

17. Idrus, L. (2019). Evaluation in the Learning Process. ADAARA : Jurnal Manajemen Pendidikan Islam. Voume 9 No 2, Agustus 2019, Hal. 920-935

18. Irina, A. & Liliana. (2011). Pedagogical competences – the key to efficient education. International Online Journal of Educational Sciences. 3(2), 411-423

19. Irwantoro N., & Suryana Y., (2016). Pedagogical Competence. Sidoarjo:Genta Group Production.

20. Kartiwi, Y. M. & Rostikawati, Y. (2022). Utilization of Canva Media and Quizizz Application in Learning Fable Text for Junior High School Students, Semantik: Volume 11, No. 1, February 2022

21. Khahro, S.H.; Javed, Y. Key Challenges in 21st Century Learning: A Way Forward towards Sustainable Higher Educational Institutions. Sustainability 2022, 14, 16080.

22. Kiamsin, L. & Talin, R. (2018). Student-preferred History Teaching Methods and Their Justifications. Malaysia Jurnal of Social Science and Humanities. Vol. 3. Issue 2 (page 137-145).

23. Law of the Republic of Indonesia Number 14 of 2005 concerning Teachers and Lecturers.

24. Law of the Republic of Indonesia Number 20 Year 2003 on the National Education System.

25. Liakopoulou, M. (2011). Teachers Pedagogical Competence as a Prerequisite," Eur. J. Educ., vol. 46, no. 4, pp. 474–488.

26. McClelland, D. C. (1973). Testing for Competence Rather Than for Intelligence. American Psychologist, 28, 1-14.

27. Miles, M. B. dan Huberman, A. M. 1992. Qualitative Data Analysis: A Sourcebook of New Method. Translation of Tjetjep Rohendi Rohidi. Qualitative Data Analysis: A Sourcebook of New Methods. Jakarta: Penerbit Universitas Indonesia (UI-PRESS).

28. Moleong, Lexy J. (1996). Qualitative Research Methodology. Bandung: Remaja Roesdakary.

29. Munawarah. (2018). The influence of lecturers' pedagogical competence on student learning motivation in descriptive statistics courses in the Islamic economics study program, majoring in sharia and Islamic economics stain watampone. Ekspose Volume 17, Nomor 2.

30. Nasution. (1988). Naturalistic-Qualitative Research Methods. Bandung: Tarsito.

31. Noss, R. (2012). 21st Century Learning for 21st Century Skills: What Does It Mean, and How Do We Do It?. Conference: Proceedings of the 7th European conference on Technology Enhanced Learning.

32. Olsson, T., Martensson, K. & Roxa, T. (2010). Pedagogical Competence – A Development Perspective From Lund University. Uppsala University Division for Development of Teaching and Learning : Swedia

33. Olsson, T., Martesson, K. & Roxå, T. (2008). Evaluating rewards for excellent teaching – a cultural approach, The HERDSA (Higher Education Research and Development Society of Australasia) 2008 International Conference

34. Priscilla, C. & Yudhyarta, D.Y. (2021). Implementation of the Pillars of Education UNESCO. Asatiza : Jurnal Pendidikan. Vol 2 No 1. 64-76.

35. Rahman, A. M., Mutiani & Putra M. A. H. (2019). The influence of lecturers' pedagogical competence on the learning motivation of ips education students.. Jurnal Darussalam; Jurnal Pendidikan, Komunikasi dan Pemikiran Hukum Islam. Vol. X, No 2: 375-387. ISSN: 1978-4767 (Cetak), ISSN: 2549-4171 (Online).

https://doi.org/10.56294/sctconf2024.996

36. Rawung, W. H., Katuuk, D. A., Rotty, V. N. J. & Lengkong, J. S. J. (2021). Curriculum and its Challenges in the 21st Century. Journal of Education Management Bahana. Volume 10 Number 1 Tahun 2021, pp 29-34

37. Regulation of the Minister of National Education No. 16/2007 on Teacher Academic Qualifications and Competencies.

38. Rifin, F., Awang, M. M., Ahmad, A. R. & Dahalan, S. C. (2019). Issues and Challenges in 21st Century Learning of History Education. Social Sciences, Education and Humanities (GCSSSEH), Volume 2. 59-63.

39. Rosidin, U., Maulina, D. & Kadaritna, N. (2020). Improving Lecturers' Pedagogical Competence through the Preparation of High Order Thinking Skills (HOTs) Questions. Axiology. Vol 4, No 2.

40. Ruang Guru. (2017). Teacher Professionalism. Teras Academy. https://www.terasacademy.com/2017/02/profesionalisme-guru.html

41. Ryegard, A. (2008). En ny karriärväg för högskolans lärare. Västerås: Mälardalens högskola.

42. Ryegard, A., Apelgren, K., & Olsson, T. (2010). About The Project – Background, Organisation And Results. Uppsala University Division for Development of Teaching and Learning : Swedia

43. Samusevica, A. & Striguna, S. (2017). The Development of Teachers' Pedagogical Competence in the Process of Selfeducation at the University. International Journal on Lifelong Education and Leadership. Vol 3 (2).

44. Sepuluh Kompetensi Guru Di Abad 21. http://kompetensi.info/kompetensi-guru/sepuluh-kompetensi-guru-di-abad-21.html

45. Shoffa, S. dkk. (2021). Development of Learning Media in Higher Education. Bojonegoro: Penerbit CV. Agrapana Media

46. Sudjana, N. (2011). Assessment of Teaching and Learning Process Results.Bandung: Remaja Rosdakarya

47. Sugiyono. (2021). Quantitative, Qualitative and R&D Research Methods. Bandung: Alfabeta.

48. Sukmadinata. N. S. (2011). Psychological Foundations of the Educational Process. Bandung : Remaja Rosdakarya.

49. Sukmana, W.J. (2023). Literacy and 21st Century Education. Learning Publications. Vol 2 No 2 (2023): Pendidikan dan Teknologi.

50. Suntoro, I, R., (2021). Teachers' Pedagogical Competence in Implementing Thematic Learning Online in Elementary Schools. Journal of Learning Research and Innovation,1(2), 228-239.

51. Susanto, R., Rozali, Y. A., & Agustina, N. (2021). Pedagodic Competence Development Model. Esa Unggul. https://digilib.esaunggul.ac.id/public/UEU-paper-22765-21_0352.pdf

52. Wiradinata, D. R. (2013). Improving the Quality of Lectures through Team Teaching. Jurnal Ilmiah Pend. Ekonomi. Volume 1 Nomor 2, September 2013, Hal. 68-81

FINANCING

No Financing.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION

Conceptualization: Viviana Mayasari, Devani Laksmi Indyastuti, Daryono.
Data curation: Viviana Mayasari, Devani Laksmi Indyastuti, Daryono.
Formal analysis: Viviana Mayasari, Devani Laksmi Indyastuti, Daryono.

Research: Viviana Mayasari, Devani Laksmi Indyastuti, Daryono.
Methodology: Viviana Mayasari, Devani Laksmi Indyastuti, Daryono.
Project management: Viviana Mayasari, Devani Laksmi Indyastuti, Daryono.
Resources: Viviana Mayasari, Devani Laksmi Indyastuti, Daryono.
Software: Viviana Mayasari, Devani Laksmi Indyastuti, Daryono.
Supervision: Viviana Mayasari, Devani Laksmi Indyastuti, Daryono.
Validation: Viviana Mayasari, Devani Laksmi Indyastuti, Daryono.
Display: Viviana Mayasari, Devani Laksmi Indyastuti, Daryono.
Drafting - original draft: Viviana Mayasari, Devani Laksmi Indyastuti, Daryono.
Writing - proofreading and editing: Viviana Mayasari, Devani Laksmi Indyastuti, Daryono.

https://doi.org/10.56294/sctconf2024.996