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Necessary to Increase Teacher Competency in Facing the Artificial Intelligence Era

Imron Muttaqin

Institut Agama Islam Negeri (IAIN) Pontianak, Jl. Letjend. Suprpto No. 19 Pontianak,
West Borneo, Indonesia
imron.muttaqin@gmail.com

ABSTRACT: *This study aimed to describe the requisite competence levels of educators in adapting to the era of Artificial Intelligence and identify the challenges that educators encounter in effectively responding to this technological epoch. The present research uses literature review techniques to gain insights. The data for this study is sourced from various documents, including scholarly articles, conference proceedings, books, research reports, and online news publications. Content analysis is employed as the principal method of data analysis to derive meaningful conclusions. The findings of this investigation underscore the pivotal role of teacher competence in navigating the landscape of Artificial Intelligence. Educators must possess professional, pedagogical, personal, and social competencies to effectively engage with the Artificial Intelligence era. Furthermore, educators must demonstrate proficiency in harnessing digital technology for instructional purposes, creating digital-based educational resources, and adeptly utilizing search engines to curate relevant materials. This imperative stems from the contemporary student demographic, often called digital natives, who are inextricably linked to digital technology, particularly within social media. Significantly, the Artificial Intelligence era has brought to light a predicament for educators, potentially impeding the efficacy of classroom-based instruction. Instruction of inadequate teacher competence, particularly in pedagogical skills and the utilization of digital technology, can engender a monotonous learning experience, consequently diminishing students' enthusiasm for the educational process.*

Penelitian ini bertujuan untuk mendeskripsikan tingkat kompetensi yang diperlukan pendidik dalam beradaptasi dengan era Kecerdasan Buatan dan mengidentifikasi tantangan yang dihadapi pendidik dalam merespons era teknologi ini secara efektif. Penelitian kali ini menggunakan teknik tinjauan pustaka untuk mendapatkan wawasan. Data penelitian ini bersumber dari berbagai dokumen, antara lain artikel ilmiah, prosiding konferensi, buku, laporan penelitian, dan publikasi berita online. Analisis isi digunakan sebagai metode utama analisis data untuk memperoleh kesimpulan yang bermakna. Temuan investigasi ini menggarisbawahi peran penting kompetensi guru dalam menavigasi lanskap Kecerdasan Buatan. Pendidik harus memiliki kompetensi profesional, pedagogi, pribadi, dan sosial agar dapat terlibat secara efektif dengan era kecerdasan buatan. Selain itu, pendidik harus menunjukkan kemahiran dalam memanfaatkan teknologi digital untuk tujuan pengajaran, menciptakan sumber daya pendidikan

berbasis digital, dan mahir memanfaatkan mesin pencari untuk menyusun materi yang relevan. Keharusan ini berasal dari demografi pelajar masa kini, yang sering disebut sebagai penduduk asli digital (*digital native*), yang sangat terkait dengan teknologi digital, khususnya dalam media sosial. Secara signifikan, era Kecerdasan Buatan telah mengungkap kesulitan yang dihadapi para pendidik, yang berpotensi menghambat efektivitas pengajaran berbasis kelas. Kompetensi guru yang belum memadai, khususnya dalam keterampilan pedagogik dan pemanfaatan teknologi digital, dapat menimbulkan pengalaman belajar yang monoton, sehingga menurunkan semangat siswa terhadap proses pendidikan.

Keywords: *Teacher Competency, Artificial Intelligence, Learning Technologies.*

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I. INTRODUCTION

Education constitutes a concerted endeavour to cultivate human resources and foster communal well-being (Nuryadi & Widiatmaka, 2023). It remains an undeniable fact that nations across the globe steadfastly strive to enhance educational quality and equitable access within their respective domains. Among the pivotal yardsticks for elevating educational standards lies in the figure of educators. Therefore, the government is paramount in maximizing teachers' pivotal role in realizing national objectives, primarily cultivating the citizenry (Martínez-Zarzuelo et al., 2022). Functioning as both the custodian of the state and the architect of policies, the government bears the onus of crafting measures that effectively galvanize educators to enhance their competencies. For educators in Indonesia, a comprehensive mastery of specific competencies is a prerequisite. This mandate is articulated in Article 10 of Law Number 14 of 2005 concerning teachers and lecturers, which delineates the competencies educators must possess, namely pedagogic, professional, social, and personal competencies. Additionally, a pivotal imperative for educators to facilitate the realization of national aspirations involves their aptitude to adapt and evolve following the shifting times. This underscores the indispensability of remaining current and responsive to contemporary trends.

The emergence of Artificial Intelligence (AI) technology presents a noteworthy paradigm shift in the realm of education, particularly in Indonesia. In light of the historical predominance of economic and industrial entities in driving advancements in science and technology, AI's advent holds promising potential for educational enhancement. By harnessing the capabilities of AI within education, the augmentation of human resource quality becomes a tangible prospect. Moreover, educators stand to benefit from the facilitation provided by AI in delivering instruction and guidance to students (Hu & Pan, 2023). AI is a pinnacle of contemporary technological and informational progress, exerting profound influence across human existence. As a virtual cognitive entity within computer systems, AI is a versatile tool akin to a robotic cognitive extension. The pervasive influence of AI spans diverse domains of human activity, spanning economics, politics, socio-cultural realms, security, and education, among others (Sanusi et al., 2022). Fundamentally, AI streamlines human tasks, and its optimal deployment has the potential to yield remarkable dividends. In concurrence

with the perspective presented by Haugeland, AI can be construed as a cognitive architecture that emulates the intricacies of human thought processes, effectively replicating human brain functionality (Ramadhanty & Albertus, 2021). Indeed, ChatGPT exemplifies a concrete manifestation of AI advancement. Currently embraced by students as a tool to facilitate coursework completion, ChatGPT encapsulates the practical utilization of AI technology within the educational landscape.

Within the realm of education, the significance of Artificial Intelligence (AI) is pronounced, particularly within the context of the learning process. AI is a foundational element of learning media, essentially serving as a conduit through which educational objectives can be effectively realized. The paramount nature of AI's role necessitates that educators possess the capability to harness AI technology proficiently. Nevertheless, it is essential to underscore that, despite AI's integral role, it cannot supplant the indispensable role of educators in the learning journey. The teacher's role transcends mere knowledge dissemination; it encompasses nurturing, inspiring, and instilling affective and psychomotor dimensions within students, fostering holistic development (Lestari et al., 2022);(Ikhwan et al., 2020).

AI's function within the learning process extends to constructing behavioural systems akin to human cognitive processes orchestrated by computer systems. Through this mechanism, educational resources can be expanded, and diverse learning modalities can be facilitated (Lo Piano, 2020). The evolution of technology within the educational sphere is indispensable to bolstering the learning process, augmenting human resources, and enabling global competitiveness (Rahadiantino, 2022). In the contemporary landscape, students are emblematic of the digital native generation, intrinsically tied to their smartphones and internet access, exemplifying a lifestyle immersed in online engagement (Nuryadi et al., 2023);(Hamzah et al., 2022). This trend is particularly evident in Indonesia, where teenagers predominantly use the Internet with an impressive penetration rate of 99.16 percent within 2021-2022 (Bayu, 2022). The Ministry of Communication and Information Technology data corroborates that 98 percent of Indonesian youths are versed in internet usage, with 79.5 percent actively engaging with online platforms (Kominfo, 2014).

This prevailing phenomenon underscores the imperative for educators in Indonesia to possess adeptness and acumen in harnessing the potential of the Internet, particularly within the educational context. It becomes crucial for educators to be proficient in utilizing digital-based learning mediums such as YouTube, Instagram, Facebook, and various other applications. However, the prevailing challenge lies in educators' pervasive lack of comprehension and utilization of Artificial Intelligence (AI) technology, engendering a significant predicament within the Indonesian educational landscape. The dearth of AI integration and comprehension poses a grave concern. The execution of a learning regimen that leverages AI technology unveils a distinct hurdle wherein educators encounter difficulties in effectively utilizing and cultivating digital-based learning resources.

Consequently, despite the semblance of integrating digital platforms, educators often need help to optimize their use, compromising achieving intended learning objectives (Desyandri et al., 2021). Using digital-based learning tools inherently aligns with pedagogic competencies, constituting a constituent element of the four-pronged teacher competencies delineated in Law Number 14 of 2005 on Teachers and

Lecturers. Regrettably, the current milieu is characterized by a conspicuous dearth of educators who have mastered these competencies, particularly the pedagogical facet. This deficiency inevitably reverberates into a failure to realize desired learning outcomes. Addressing this critical issue mandates concerted efforts to bolster educators' proficiency in AI and digital-based learning media. Facilitating training and support systems geared towards enhancing pedagogical competencies will be pivotal in ameliorating this prevailing challenge within the Indonesian education domain.

Previous research was conducted by (Sasmito et al., 2021) on introducing Artificial Intelligence for teachers and students of SMK Nurul Islam Larangan. The results showed that the presence of training or workshops related to Artificial Intelligence can enhance the knowledge and skills of teachers in utilizing digital technology. Therefore, this needs to be carried out by various parties so that human resources, especially teachers and students, can be improved or be of quality. Further research was also conducted by (Mambu et al., 2023) about utilizing Artificial Intelligence in facing the challenges of teaching teachers in the digital era. The results showed that Artificial Intelligence cannot replace the role of teachers but only serves as a helper in the learning process. In addition, if teachers can utilize Artificial Intelligence technology, then teachers can manage the class well, even though today's students are a digital generation that cannot be separated from the Internet. However, the use of Artificial Intelligence technology must also be limited, as there are concerns that students' interest in class will further decrease. The research conducted by Sasmito et al. focused on improving the knowledge and skills of teachers and students through training and workshops (Soim et al., 2022).

In contrast, this research emphasizes the competencies teachers need in facing Artificial Intelligence. Then, the research conducted by Mambu et al. stressed the importance of utilizing Artificial Intelligence technology in learning. At the same time, this research focuses on the competencies teachers need in responding to Artificial Intelligence. Therefore, the novelty in this research is that a teacher requires competencies as an educator in facing the advent of Artificial Intelligence technology in education. This research aims to determine the teacher competencies required to respond to the age of Artificial Intelligence and to identify the challenges teachers face in responding to the age of Artificial Intelligence.

II. METHOD

This research uses a qualitative approach, and the research method employed is library research because the data related to this study concerns the competence of teachers in welcoming the Artificial Intelligence era, and it utilizes findings from previous studies conducted by researchers. Data collection techniques in this research involve a literature study (journal articles, books, proceedings, research reports, online news, and so forth). The data analysis techniques used in this study are 1) collecting data related to teacher competence in welcoming the Artificial Intelligence era, 2) sorting data, 3) coding each data set, 4) simplifying data, and 5) concluding the processed data (Moleong, 2018). The research conclusion is of utmost importance because it serves as the primary basis for making recommendations given to various related parties (Ikhwan, 2021).

III. RESULT AND DISCUSSION

Teacher Competence to Face the Age of Artificial Intelligence

Artificial Intelligence, commonly called AI, is a machine designed by humans to assist human activities or tasks in daily life. In the education sector, the role of Artificial Intelligence is also constructive in quickly and accurately searching for literacy in the form of information, making the learning process more effective and efficient in developing quality students. The classroom has transformed from conventional to digital learning, making the learning process more engaging, participatory, creative, and diverse. However, the teacher is the most crucial component in learning that utilizes Artificial Intelligence technology. Therefore, the teacher's perspective must change from initially being a knowledge provider to students to becoming a facilitator, inspirator, motivator, mentor, guide, and developer of students' imaginations (Zulkifli, 2020). To implement these roles, a teacher must have competence as an educator, as the teacher's competence greatly influences the achievement of learning objectives.

Competence refers to the knowledge and skills absorbed from the social and work environment, functioning as an instrument in creating value through tasks and work. A teacher's competence and performance influence the success of student learning in the learning process (Sudrajat, 2020). Teacher performance indicators can be seen in teaching methods, guiding and mentoring students, and the learning objectives designed or prepared before the learning process begins.

Teacher competence dramatically influences the success of achieving learning objectives in the classroom. Therefore, it is undeniable that as a teacher, one must be able to master and implement teacher competencies, especially those listed in Law Number 14 of 2005 about Teachers and Lecturers in Article 10, namely: 1) Professional competence related to the mastery of learning material concepts broadly and deeply. This includes curriculum subjects in schools and the scientific fields encompassing that learning material. 2) personality competence related to individual or personal abilities that can reflect a teacher's personality. In this case, the teacher should be wise, responsible, exemplary, mature, and so on. 3) Social competence is related to a teacher's ability to socialize or interact well, correctly, and effectively with stakeholders (students, educational staff, and fellow teachers) and the community environment. Through this competence, everyone who communicates with the teacher is expected to feel safe and comfortable. 4) Pedagogical competence is related to the ability to manage students in the learning process, from preparation or design of learning, implementation of learning, evaluation of student learning outcomes, and the development of students in actualizing various potentials within themselves (Notanubun, 2019). However, in responding to the development of the times, especially Artificial Intelligence, pedagogical competence needs to be emphasized and developed. Managing the classroom requires modes and methods of learning and practical learning media. In determining learning media, one must be able to follow the development of the times and the psychological development of students so that the learning process can run effectively and learning objectives can be achieved.

Pedagogical competence refers to an educator's ability to manage students within the learning process, which encompasses several indicators: a) understanding the foundational principles of education, b) recognizing the diversity and potential of students to determine effective learning strategies, c) the ability to develop a syllabus and organize learning plans and strategies based on competency standards and

essential competencies, d) and the ability to manage a classroom and cultivate a conducive learning environment for students (Damanik, 2019);(Rohmad et al., 2020).

In the Artificial Intelligence (AI) era, pedagogical competence is crucial. Educators must master it to create an atmosphere that makes students feel comfortable and enhances their learning enthusiasm. Proficiency in operating digital technology is equally vital, considering that in the AI era, every educator should be able to operate digital tools like Google Sheets, Wolfram Alpha, Kahoot, Grammarly, and others. The learning process within an AI system focuses on enhancing the learning experience and the student's focus. AI technology is a learning medium capable of aiding educators in teaching and assisting students in identifying complex concepts, thereby enhancing student competencies (Li et al., 2023). Students' competencies involve understanding the materials delivered by the educators through the learning process, encompassing cognitive, affective, and psychomotor abilities and students' intelligence (Intellectual et al.) (Sanusi et al., 2022). However, most importantly, in the AI era, for 5 educator to develop students' competencies, in addition to the competencies mandated by Law Number 14 of 2005 concerning Teachers and Lecturers (pedagogical, professional, personality, and social), digital competence is essential, especially considering that today's students are of the digital native generation.

Digital competence entails overseeing learning, emphasizing involvement, and reflective practice via digital technology (Yang et al., 2023). In contrast, the digital generation refers to individuals born during the advent of digital technology, making them inherently familiar with it. Such "digital natives" exhibit specific traits, such as an aversion to long waits, a thirst for quick and current information, an inescapable reliance on the Internet, and a desire for acknowledgement from their peers (Widiatmaka et al., 2023). The proliferation of videos and photos from these digital natives on social media platforms like Instagram, TikTok, and Facebook primarily stems from a desire for external validation. Educators must astutely recognize and respond to these tendencies within the educational process, underscoring the vital need for digital competence among teachers in Indonesia.

In essence, digital competence for educators involves integrating theory with practice, fostering creativity, designing engaging activities, and promoting problem-solving skills. It encourages students to remain active participants and emphasizes collaboration. However, digital competence is more than just educators harnessing digital technology in the AI era. Instead, they should be facilitators, leveraging digital tools to cultivate students' critical thinking and foster their affective development. Key digital competencies for educators in the age of AI include adeptness at incorporating social media into the learning process, designing digital-based learning materials, and utilizing search engines for sourcing content (Sitompul, 2022). Embracing digital competence in the AI era is paramount for nurturing the competencies of digital native students, ensuring an effective and efficient learning experience.

Challenges and Adaptations of Teachers in Responding to Artificial Intelligence

The incorporation of digital technology in the learning process has constantly evolved, especially in the era of Artificial Intelligence. However, the current interest level of students needs to be higher due to the monotonous teaching methods and learning media used by teachers (Subandowo, 2022). Developing student competencies in the Artificial Intelligence era can be accomplished through various means, such as leveraging digital-based learning tools. However, many teachers still have not

mastered ^{the} competencies mandated for educators by the 2005 Law No. 14 on Teachers and Lecturers, including personal, professional, ^{social}, and pedagogical competencies. Field data indicates that numerous teachers ^{have yet to utilize digital-based learning media}, even when dealing with students who are digital natives (Budiana, 2021).

Additionally, many teachers must become role models for their students using their mobile phones responsibly. Consequently, many students access sites with damaging content like pornography, online gambling, and the like. Without time restrictions on phone usage, these students risk their mental and physical health, potentially leading to decreased learning interest (Diplan, 2019).

In the Artificial Intelligence era, many teachers need help to adapt to the evolving times, especially in terms of learning technologies, making the learning process dull for students (Imran et al., 2023). Frequently used teaching methods include lectures and assignments without incorporating digital technology. This affects students' interest in learning and their character and mental and emotional development (Prasetyo & Bratanin, ²⁰²²). The teaching methods implemented are monotonous, given that ^{teachers should ideally serve as role models for their students}. As bearers of the responsibility to develop student competencies, teachers should possess several qualities: a) a commitment to achieving the goals of education and students' aspirations, b) upholding values of honesty as the foundation of religious character, c) competence as educators, especially in conducting both offline and online learning, and d) a focus on the advancement of knowledge (Sugara & Mutmainnah, 2020).

Most teachers today belong to Generation X, averaging around 50, and must be better-versed in communication and information technology advancements. However, every teacher is expected to utilize digital technology in the Artificial Intelligence era, especially in learning (Fiandra, 2020). This poses challenges for teachers over 50 years old or those from Generation X, as they are dealing with students who are digital natives. These students are inseparable from digital technology, mainly social media. So, when teachers cannot adapt or align with technological advancements, the learning process faces obstacles, and educational goals still need to be fully realized (Tang et al., 2020). This ^{phenomenon} is concerning since many teachers have yet to harness digital technology ^{in the learning process}, hindering ^{the development of} student competencies.

Many teachers need more creativity and innovation when determining educational strategies in the age of Artificial Intelligence. Teachers must recognize and address the shortcomings present in their instructional methods. Particularly, educators teaching Islamic Religious Studies should be incorporating a diverse array of digital-based teaching methods. A prevalent problem is that many teachers need to be more familiar with or hesitant about integrating digital technology into their instruction, even when their students may better grasp such technologies. Avoiding using digital tools during this AI-driven era can impede the optimal development of student competencies. The AI era offers a variety of tools designed to streamline the teaching process, ranging from task assignments, lesson planning, and selecting instructional methods to even aiding in information searches and utilizing platforms like ChatGPT (Pantan, 2023). However, the ground reality suggests a stark contrast, as many educators need to leverage the benefits provided by AI. If educators harness the potential of digital

technology in this era, they might face fewer challenges in lesson preparation (Benyamin et al., 2022).

The advent of Artificial Intelligence, rather than presenting vast opportunities for educators to foster comprehensive student development, has introduced challenges. Many educators, typically those over 50 and categorized as Generation X, struggle to adapt to these rapid advancements, especially within the context of the AI era (Chen et al., 2021). However, the digital tools emerging in this era have the potential to facilitate the educational process significantly.

IV. CONCLUSION

Artificial Intelligence (AI) is a technological advancement that every individual must adapt to, given its implications for all human life. The impact of AI extends to the educational realm, necessitating teachers to adjust to these changes. By doing so, the learning process can be conducted more effectively and efficiently, ensuring that educational objectives are achieved. The key to navigating the AI era lies in a teacher's competence. As mandated by Law Number 14 of 2005 concerning Teachers and Lecturers, educators must master competencies in professionalism, pedagogy, personality, and social interactions to face the challenges of AI. Furthermore, educators should be adept at utilizing social media for instructional purposes, designing digital-based learning materials, and employing Search Engines for material sourcing. Social media is crucial since today's students, often called digital natives, are intricately tied to digital technology, especially social media. Surprisingly, many educators do not perceive the AI era as an opportunity to enhance student competencies. Instead, it has been viewed as a challenge or obstacle, especially when teaching digital natives. These challenges largely stem from the educators' limited competencies, particularly in pedagogy, and their inability to integrate digital technology into the teaching process. This leads to a monotonous learning environment, impacting students' enthusiasm and diminishing their interest in learning.

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