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Coding and Artificial Intelligence (AI) learning in teachers' perspective

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ABSTRACT

Technological advancements have brought about changes to the curriculum, particularly the integration of coding and Artificial Intelligence (AI) into learning. This study aims to explore teachers' perspectives on coding and AI learning policies in the Kurikulum Merdeka, focusing on the factors that influence the adoption and acceptance of technology. The research was conducted using a qualitative approach, using in-depth interviews with six teachers from elementary, junior high, high school, and vocational school levels in Bandung City. The analysis framework utilizes the Unified Theory of Acceptance and Use of Technology (UTAUT) theory, which encompasses four key constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions. The results indicate that teachers have positive expectations regarding the benefits of learning coding and AI. However, challenges persist in terms of infrastructure readiness, training, and institutional support. Perceived ease of use and social influence varied depending on the level and type of school. The research conclusion reveals that, although teachers in Bandung City generally exhibit a positive attitude towards coding and AI learning in the Kurikulum Merdeka, the level of implementation readiness remains unequal across educational units, necessitating contextual and adaptive policies.

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ABSTRAK

Perkembangan teknologi telah membawa perubahan pada kurikulum, khususnya masuknya koding dan Kecerdasan Artifisial (KA) dalam pembelajaran. Penelitian ini bertujuan untuk menggali perspektif guru terhadap kebijakan pembelajaran Koding dan KA dalam Kurikulum Merdeka, dengan fokus pada faktor-faktor yang mempengaruhi adopsi dan penerimaan teknologi. Penelitian dilakukan dengan pendekatan kualitatif menggunakan metode wawancara mendalam kepada enam guru dari jenjang SD, SMP, SMA, dan SMK di Kota Bandung. Kerangka analisis menggunakan teori Unified Theory of Acceptance and Use of Technology (UTAUT), mencakup empat konstruk: performance expectancy, effort expectancy, social influence, dan facilitating conditions. Hasil penelitian menunjukkan bahwa guru memiliki ekspektasi positif terhadap manfaat pembelajaran Koding dan KA, namun masih terdapat tantangan dalam hal kesiapan infrastruktur, pelatihan, dan dukungan institusional. Persepsi kemudahan penggunaan dan pengaruh sosial bervariasi tergantung pada jenjang dan jenis sekolah. Kesimpulan penelitian menunjukkan bahwa meskipun guru di Kota Bandung secara umum menunjukkan sikap positif terhadap pembelajaran koding dan KA dalam Kurikulum Merdeka, tingkat kesiapan implementasi masih timpang antar satuan pendidikan sehingga diperlukan kebijakan yang kontekstual dan adaptif.

Kata Kunci: *kecerdasan artifisial; koding; perspektif guru; UTAUT*

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INTRODUCTION

The rapid development of technology, especially in the field of coding and Artificial Intelligence (AI), has had a significant impact on the world of global and national education. Over the past few years, coding and Artificial Intelligence (AI) have become an integral part of the curriculum in many countries, such as China, South Korea, Australia, Singapore, and India, in response to the need to prepare learners for the digital age full of innovation and challenges. This technology is influencing the way we teach and learn, allowing for the creation of more interactive, project-based, and problem-solving-oriented learning methods that are applicable (Fajriati *et al*., 2024). Coding, as a fundamental skill in the digital world, is important to be taught from an early age, as it provides a foundation for understanding the logic and algorithms used in daily life as well as the industrial world (Lee, 2020). Meanwhile, trains have the potential to change the way we interact with technology, with their applications in various fields, including education (Adiman *et al*., 2024).

In Indonesia, the Merdeka Curriculum provides space for learning innovations involving technology, including coding and Artificial Intelligence (AI) teaching. It aims to prepare future generations with skills relevant to the demands of the 21st century, including the ability to think critically, creatively, and adaptively to the changing times (Sapitri, 2022). Therefore, it is important to look at how the implementation of this policy can accelerate the transformation of education in response to social and technological changes that occur in society. Social dynamics and technological developments have had a profound impact on the way we design educational curricula. Social changes, such as globalization and the digital revolution, have prompted the need to reform the curriculum to include aspects of 21st-century skills, such as technical and social skills that meet the demands of the modern world. Technology, especially in the form of coding and Artificial Intelligence (AI), is an important element in the curriculum that plays a role in preparing students to face future dynamics and challenges (Ayanwale *et al*., 2022; Yim, 2024).

The curriculum must be adaptive to these social changes by creating space for learners to learn skills that can connect them to the broader world. The social changes triggered by globalization demand that the education system prepare learners with skills that can increase their competitiveness in the global market. In addition, a curriculum that is responsive to technological developments provides students with the opportunity to innovate and create through mastery of digital technology (Yadav *et al*., 2016). Therefore, the education curriculum in Indonesia needs to continue to make adjustments and adopt technology-based learning to prepare future generations to face increasingly complex challenges.

The Government of Indonesia, through the Academic Manuscript on coding and AI learning in Primary and Secondary education, has established a strategic policy to integrate coding and Artificial Intelligence (AI) learning into the Merdeka Curriculum starting from the 2025/2026 school year. This policy aims to prepare students to face the challenges of the 21st century, marked by digital transformation and rapid technological advancements. The integration of coding and Artificial Intelligence (AI) in the curriculum is designed to equip learners with digital literacy, computational thinking, problem-solving, creativity, and an ethical understanding of technology, which are essential in modern life and the world of work. The application of this subject is optional and will start from the 5th grade of Elementary

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School (SD), Junior High School (SMP), to the Senior High School/Vocational (SMA/SMK) level, with a time allocation that varies according to the level of education. Through this policy, it is hoped that students will not only master conceptual knowledge but also have practical skills that can be applied in a real context, so that they can adapt and contribute to the era of globalization and digitalization.

In implementing coding and Artificial Intelligence (AI) learning policies in the Merdeka Curriculum, teachers are faced with various significant challenges and obstacles. One of the main obstacles is the limited resources, both in the form of technological infrastructure and appropriate teaching materials to support coding and Artificial Intelligence (AI) learning in schools (Kartiasih *et al*., 2023). In addition, the lack of adequate training for teachers to master the concepts and techniques of teaching coding and Artificial Intelligence (AI) is also a big obstacle. Many teachers feel that they are not ready to teach the material due to limited knowledge and skills in the field of technology. The influence of social perceptions of technology also affects teachers' attitudes towards these policies; some teachers may feel concerned about the significant changes in teaching methods needed to integrate technology into daily learning (Dzattdini *et al*., 2025).

In addition, the fear that technology could replace their role in the classroom is also an inhibiting factor in the acceptance of this policy, even though technology can be a tool that enriches the learning experience. However, until now, there is still minimal research that explores explicitly in depth how teachers' perspectives on this new policy are, especially in the context of their psychological, pedagogical, and technological readiness in implementing coding and Artificial Intelligence (AI) learning at various levels of primary and secondary education in Indonesia. The novelty of this research is to present an empirical mapping of teachers' perceptions holistically using the theoretical framework *of the Unified Theory of Acceptance and Use of Technology* (UTAUT), which has not been widely used in the context of coding learning policies and training in the Merdeka Curriculum.

The teacher's perspective is critical in understanding and evaluating the implementation of education policies, especially those related to coding and Artificial Intelligence (AI) learning. Teachers are the most directly involved in the teaching and learning process, so their attitudes and perceptions of this policy will significantly affect the success of its implementation in the classroom (Galindo-Domínguez *et al*., 2024). Social factors play a significant role in the acceptance and implementation of curriculum changes, both in terms of students, teachers, and the community. Teachers who have a good understanding of the benefits of technology in education will be more open to change and better able to overcome the challenges that arise (Ayanwale *et al*., 2022; Sanusi *et al*., 2024). Therefore, it is important to listen to and understand teachers' perspectives in designing and implementing education policies, especially as they relate to technology, to ensure that such changes are acceptable and implemented effectively at a practical level (Fahdia & Lestari, 2025; Mualimin *et al*., 2025).

Teachers' perspectives can provide important insights into how these policies can be adapted to real conditions on the ground, especially in the face of existing obstacles and challenges. On the other hand, an assessment of teachers' views on coding and Artificial Intelligence (AI) learning can provide valuable information about the practical challenges they face, such as training limitations, resources, and their readiness to teach evolving technology (Purnama

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et al., 2025) rapidly. In addition, the teacher's perspective also reveals how these new technologies and curriculum are being accepted at the school level, as well as how teachers are adapting their teaching methods to accommodate these changes. The involvement of teachers in curriculum evaluation can cause coding and Artificial Intelligence (AI) learning policies to be more easily adapted to real needs in the field and facilitate the achievement of better educational goals. This can strengthen the implementation of a curriculum that is more inclusive and relevant to technological developments (Lukman & Nurhayati, 2024).

Research on teachers' perspectives on coding and Artificial Intelligence (AI) learning policies is fundamental because teachers are the leading actors who are directly involved in the learning process in the classroom (Ayanwale *et al*., 2022). Their perspectives can reflect the extent to which these policies are understood, accepted, and implemented effectively on the ground. Some studies show that teachers often feel ill-equipped to teach coding and Artificial Intelligence (AI), either due to the limited training received or the lack of supporting resources (Adawiyah & Rindaningsih, 2024; Aljemely, 2024; Purnama *et al*., 2025). This situation confirms the importance of further exploration through research to understand the challenges faced by teachers and how these policies can be tailored to their needs, as well as to find the best ways to engage them in the implementation of technology-based curriculum. This research is significant because, in addition to offering a qualitative approach that focuses on teachers' interpretation of new policies, it systematically uses the UTAUT framework to identify factors influencing technology adoption in the context of Indonesian education, which is in a period of policy transition.

The general purpose of this research is to explore teachers' perspectives on coding and Artificial Intelligence (AI) learning policies in the Merdeka Curriculum, paying special attention to aspects that affect the use and acceptance of technology at the primary to upper secondary education levels. Meanwhile, the specific purpose of this research is to identify teachers' expectations for the benefits of coding learning and Artificial Intelligence (AI) (*performance expectancy*), understand the level of ease felt by teachers in adopting this technology (*effort expectancy*), explore the social influence of the surrounding environment in encouraging the use of technology (*social influence*), and assess the availability of technical and institutional support in the implementation of the policy (*facilitating conditions*). The results of this research are expected to provide practical and theoretical contributions, both for policymakers and other education stakeholders.

LITERATURE REVIEW

Coding and Artificial Intelligence (AI) Learning in Primary and Secondary Education in the Merdeka Curriculum

Coding learning at the primary and secondary education levels refers to the introduction and mastery of computational thinking concepts, programming, and algorithmic logic that are tailored to the development stage of students (Kong *et al*., 2018). Meanwhile, train learning in the context of primary and secondary education includes an understanding of the basic principles of machine intelligence, data processing, and the application of ethics in the use of intelligent technology, which is provided through a contextual and applicative approach (Nguyen *et al*., 2023). The Academic Manuscript of Coding and Artificial Intelligence (AI)

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Learning 2025/2026 emphasizes that the scope of coding and Artificial Intelligence (AI) learning in elementary schools includes the introduction of simple patterns and instruction, while at the intermediate level, it is focused on developing projects based on digital solutions and solving real problems using KA technology. This learning is not only focused on technical skills, but also on strengthening *soft skills* such as collaboration, creativity, and critical digital literacy. The scope of coding and Artificial Intelligence (AI) learning departs from conceptual understanding to applicative practices that are oriented to 21st-century competencies.

Learning coding and Artificial Intelligence (AI) in the Merdeka Curriculum has strategic urgency in preparing students to face the digital and automation era, as well as equipping them with the high-level thinking skills needed in a knowledge-based society (Suharyo *et al*., 2024). Learning to code in school-age children has a significant impact on logical thinking, problem-solving, and decision-making skills (Lye & Koh, 2014). In addition, the integration of training in the secondary and primary curriculum provides an opportunity to introduce the ethical and social principles of technology from an early age(Zafari *et al*., 2022). The Merdeka curriculum, based on competencies and learning differentiation, provides space for the development of coding and Artificial Intelligence (AI) materials that are tailored to the local context and the needs of students. In this context, Piaget's constructivist theory and Siemens' approach to connectivityism become relevant epistemological foundations, as coding and Artificial Intelligence (AI) learning demands students' active interaction with the digital-based learning environment, as well as meaning through hands-on experience. This study places the theory of connectivity as the main framework in the research, which sees that knowledge is built through information networks and technological interactions, in line with the characteristics of train learning.

In the context of technology-based curriculum planning, a modern curriculum must instill an understanding of technology in a social context so that students can become participatory citizens in a digitalized society. The success of technology-based curriculum is highly dependent on teachers' readiness to apply a constructivist approach, which is learning that emphasizes hands-on, contextual, and student-centered experiences. A good curriculum not only adopts technology, but it must also be aligned with the social and cultural values of the school that support transformative learning. Therefore, to integrate coding and Artificial Intelligence (AI), it is important to pay attention not only to the technical aspects of learning, but also to curriculum design that is responsive to social conditions and teacher readiness. This idea is in line with the principles of the Merdeka Curriculum, which emphasizes flexibility, meaningful context, and differentiation of learning in the framework of strengthening the profile of Pancasila students (Azalia *et al*., 2023).

The Government of Indonesia, through the "*Academic Manuscript of Coding Learning and Artificial Intelligence in the Primary and Secondary Education Curriculum for the 2025/2026 Academic Year,*" has set a strategic policy direction in the integration of these two fields. This policy states that coding and Artificial Intelligence (AI) learning are no longer an addition but an essential part of strengthening the profile of Pancasila students and transforming national digital learning. The Academic Manuscript states that starting in 2025, all primary and secondary education units are expected to implement coding and Artificial Intelligence (AI) learning as part of the Informatics subject and/or the Pancasila student profile strengthening project. The government also emphasized the importance of teacher capacity development, the provision of software and hardware, and flexibility in the development of school

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curriculum to suit their respective readiness and context (Dewi & Dewi, 2024). This policy is in line with the global trend of integrating technology literacy and training into the education system from an early age. This research is in the context of the implementation of the ongoing national policy and focuses on the readiness of educational units in implementing the policy, both in terms of human resources, infrastructure, and school culture.

Acceptance Theory and Teachers' Perspectives on Educational Technology Innovation

Understanding teachers' perspectives in implementing technology-based learning policies, such as coding and Artificial Intelligence (AI), can be analyzed through a theoretical approach to technology acceptance. One of the comprehensive theories in explaining the factors that influence technology adoption is *the Unified Theory of Acceptance and Use of Technology* (UTAUT). UTAUT is a theoretical model that is widely used to understand the acceptance and use of technology, including in the context of education. UTAUT explained that an individual's intention to use a technology is greatly influenced by four primary constructs, namely: 1) *performance expectancy*, which is the extent to which individuals believe that the use of technology will help improve their performance; 2) *effort expectancy*, which is the extent to which the technology is considered easy to use; 3) *social influence*, i.e., the extent to which an individual feels that important people around him or her think that he or she should use the technology; and 4) *facilitating conditions*, i.e. the extent to which the individual believes that there is adequate technical infrastructure and organizational support to use the technology. These four constructs are very relevant in the context of education, especially in analyzing how teachers respond to innovative policies such as coding and Artificial Intelligence (AI) learning under the Merdeka Curriculum (Venkatesh *et al*, 2012).

Performance expectancy *indicators* include teachers' perceptions that the use of coding and Artificial Intelligence (AI) can increase the effectiveness of learning or student learning outcomes. The *effort expectancy indicator* includes the extent to which teachers feel able to use coding or Artificial Intelligence (AI) devices and applications easily. *Social influence*, the indicators include the influence of school principals, peers, and national education policies on teachers' decisions to adopt technology (Dwivedi *et al*., 2019). Meanwhile, *facilitating conditions* will be seen from the availability of training, technical support, hardware and software, and digital infrastructure in schools. Focusing on these indicators will help explain the main problems in the study, namely the extent to which teachers accept, are ready, and support the implementation of coding and Artificial Intelligence (AI) learning policies, as well as what factors are inhibiting or driving them. This UTAUT theory also complements the *Technology Acceptance Model* (TAM) approach, which focuses on two primary constructs, namely *perceived usefulness* and *perceived ease of use*. Although TAM has been widely used, UTAUT is considered superior because it encompasses the social dimension and conditions of organizational support, making it more suitable for complex educational contexts (Dwivedi *et al*., 2019). In addition, the concept *of Teacher Readiness for Technology Integration* adds that the success of technology integration is not only determined by the acceptance of teachers, but also by their readiness in aspects of digital competence, pedagogy, and professional attitudes to change (Valtonen *et al*., 2015).

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From the perspective of humanistic education, the approach developed by Rogers reminds us of the importance of considering human needs, experiences, and values in the technology-based learning process, so that the innovation remains on the side of the students as the main subject of learning. This study tries to understand holistically how teachers interpret coding and Artificial Intelligence (AI) learning policies, as well as the factors that affect their attitudes, readiness, and acceptance within the framework of the Merdeka Curriculum. In the context of education, several studies, such as those conducted by some experts, support that UTAUT is effective in analyzing the factors that influence the adoption of technology by teachers, including in dealing with digital innovations such as coding learning and artificial intelligence (Dwivedi *et al*., 2019). Therefore, in the framework of this research, UTAUT is used as a theoretical basis to explore teachers' perceptions of the implementation of new technologies in the school environment. In this context, this study identifies and explores various indicators that reflect the four UTAUT constructs.

Related Research

The way teachers view coding and Artificial Intelligence (AI) learning at the primary and secondary education levels is determined mainly by technological readiness, pedagogical understanding, and systemic support from schools and the government. Prospective teachers in Indonesia have a moderate level of technological knowledge and show a passion for exploring AI-based tools through training, collaboration, and self-learning (Hastomo *et al*., 2024). However, while teachers are aware of the potential of AI in improving the quality of learning, they are also expressing concern about negative impacts such as students' dependence on technology and declining social interaction in learning (Pratiwi *et al*., 2025). Another study that compared the perspectives of education students from Indonesia, the Philippines, and Japan emphasized that the use of AI in Indonesia is still constrained by infrastructure and training limitations, even though culturally, teachers have an open attitude to change (Muthohar *et al*., 2025). Meanwhile, the perception of teachers and other stakeholders greatly influences the success of AI implementation, where parental support and student understanding are also crucial factors (Akbar *et al*., 2025). In this research framework, these theories strengthen the position of researchers in exploring how teacher perception is an important factor in the readiness of the implementation of coding and Artificial Intelligence (AI) learning, as emphasized in the Academic Manuscript of Coding and Artificial Intelligence (AI) Learning that teacher training, access to resources, and positive perception are the main pillars of the success of digital innovation in schools.

Institutional and Policy Support

Institutional support is a key factor in the successful implementation of coding and Artificial Intelligence (AI) learning in primary and secondary schools. The government and education agencies have a strategic role in drafting regulations, providing infrastructure, and developing appropriate curriculum and training. The active involvement of schools and principals in digital policy-making drives systemic adoption of technology. Additionally, collaborations between schools and communities, such as local educational technology (*EdTech*) organizations, can expand access to coding and Artificial Intelligence (AI) learning

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resources (Inayah *et al*., 2024). Meanwhile, without local needs-based policies, digital programs often fail to be implemented sustainably. In this research framework, these theories are a foothold for analyzing the readiness of Indonesian educational institutions in supporting coding and Artificial Intelligence (AI) programs, as outlined in the Academic Manuscript of Coding and Artificial Intelligence (AI) learning 2025, which mentions the importance of policy orchestration from the central education unit.

Some developed countries, such as Australia and South Korea, have integrated coding and Artificial Intelligence (AI) learning in their basic education systems with comprehensive and systematic policy support. In Australia, *the Digital Project Technologies in Focus* (DTiF) policy, since 2017, has been designed to encourage collaboration between schools and across schools, supported by curriculum officers to help them apply Digital Technologies in learning. In South Korea, train integration is part of the national strategy for digital talent development, with a focus on teacher education and the development of adaptive teaching materials (Lee & Jeong, 2023). The success of digital programs in South Korea is heavily influenced by cross-sectoral support between government, industry, and higher education institutions (Kim & Kwon, 2023). However, the success of digital policies is not only determined by the availability of the curriculum, but also by the readiness of school culture and teachers' trust in technology (Scherer *et al*., 2019). Within the framework of this research, Indonesia's approach to coding and Artificial Intelligence (AI) learning is positioned to learn from successful international practices, while still adapting it to the local context as directed in the Academic Manuscript of Coding and Artificial Intelligence (AI) Learning.

METHODS

This research adopts a qualitative approach. This approach is a scientific method that aims to gain a deep understanding of a phenomenon in the social environment naturally, with an emphasis on direct and intense interaction between the researcher and the object being studied. The selection of a qualitative approach in this study is based on the aim of exploring in depth the teacher's perspective on coding and Artificial Intelligence (AI) learning policies in the Merdeka Curriculum, which cannot be adequately explained through numbers or quantitative data alone. This approach allows researchers to capture teachers' meanings, understandings, and subjective experiences in responding to these policies, including expectations, barriers, and contextual factors that affect the acceptance of educational technology. With this approach, it is hoped that a holistic understanding of teachers' attitudes and readiness towards the integration of coding and Artificial Intelligence (AI) technology in learning will be obtained.

This research was carried out in the city of Bandung using the informant selection technique by *purposive sampling,* with special criteria. The interview technique is designed in a semi-structured manner so that the researcher can explore flexible and contextual answers, while still focusing on the indicators derived from the UTAUT theory. The interview process was carried out with six informants, including two public elementary school teachers and one private elementary, junior high, high school, and vocational school teacher each who were targeted by the policy. The aspect sought in this interview is to dissect teachers' thoughts related to coding and Artificial Intelligence (AI) learning policies. The interviews in this study were conducted with a semi-structured approach, namely, the interviews took place flexibly

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but still referred to the guidelines of questions that had been prepared beforehand. The data analysis process follows the Miles and Huberman model, which includes the following stages: 1) data collection; 2) data reduction; 3) data presentation; and 4) concluding. To ensure the validity of the data, this study applied the source triangulation technique.

RESULTS AND DISCUSSION

Technology-based learning, such as coding and Artificial Intelligence (AI), in the context of the Merdeka Curriculum, is understood as a form of educational innovation that aims to prepare students to face the challenges of the 21st century. This innovation requires not only changes in curriculum content, but also in the way teachers interpret, accept, and apply it in learning practices. The findings in this study show that the perspective of teachers from elementary, junior high, and high school/vocational schools in the city of Bandung towards the Koding and KA learning policies varies widely, depending on the educational background, school conditions, and available support. The results of this study can be mapped into four main categories, as shown in the following **Table 1**.

Table 1. Teachers' Perspectives on Coding and Artificial Intelligence (AI) Learning

Category	Education level	Teacher's Perspective
Performance Expectancy	Elementary School	Public & Private: Can improve students' digital literacy from an early age, as well as train logical thinking and creativity.
	Junior High School	Very relevant and able to shape the algorithmic mindset of students for the junior high school level.
	Senior High School	As an important provision for career development and readiness to face the digital era and the industrial revolution.
	Vocational High School	It is not new because most of it has already begun to be implemented, so this policy strengthens existing programs.
Effort Expectancy	Elementary School	Public: Teachers face significant challenges in implementing coding and Artificial Intelligence (AI) learning. This is due to the limitations of infrastructure such as computers and internet networks, as well as the low technical competence of teachers who generally come from a background of general classroom teachers, not informatics. Teachers are also not used to using coding applications or software, so they need intensive training. In addition, administrative burdens such as the preparation of teaching tools (RPP, modules) are additional obstacles. Private: These challenges are relatively more minor because of adequate facilities, school policy support, and teachers who have received basic coding and Artificial Intelligence (AI) learning, as evidenced by the fact that before the policy related to coding and Artificial Intelligence (AI) learning, private elementary school students in grades 4 and 5 had already carried out the learning.
	Junior High School	At the beginning of implementation, there are obstacles in understanding the structure of coding and Artificial Intelligence (AI) materials, especially if there is no systematic module or guide. However, most teachers feel that this challenge can be overcome if training and teaching tools are available. Another supporting factor

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Category	Education level	Teacher's Perspective
		is the condition of students who are used to using computers, so that the process of introducing coding concepts is relatively more straightforward.
	Senior High School	Teachers tend to be more ready to implement coding and Artificial Intelligence (AI), mainly because students already have basic digital skills and a more mature understanding of logic. Teachers state that if teaching tools such as curriculum and modules are clearly and completely available, then the teaching process is not too complicated. However, some teachers still suggest technical assistance to minimize implementation errors and increase learning effectiveness.
	Vocational High School	It is common because the technology-based learning approach has been running before, even before this policy emerged.
Social Influence	Elementary School	Public: The school environment is not yet entirely encouraging, still relying on the initiative of the principal and teachers. Private: Strong support from the school management and the school community (including the parents of the students) encouraged the confidence of teachers to implement coding and Artificial Intelligence (AI) learning.
	Junior High School	The demands from the office and the school environment encourage the adoption of technology, although not all colleagues support it.
	Senior High School	The school environment encourages the adoption of technology because there is a digitalization target; Social pressure is quite intense from the technology teacher community.
	Vocational High School	The support from management and the vocational community is firm, even though the initiative was already underway before the official policy was published.
Facilitating Conditions	Elementary School	Public: Infrastructure is still limited. Computers/laptops are lacking, and the internet network is not stable. Training for teachers is also still minimal. Private: Adequate facilities, computer labs available, smooth internet access. The school also provides training for teachers.
	Junior High School	Infrastructure facilities are quite adequate, although not evenly distributed. There is a school IT team that can assist teachers in technical implementation.
	Senior High School	Facilities are available but limited, and teacher competencies are improved. Institutional support is starting to take shape, especially in technology-oriented schools.
	Vocational High School	The support is firm, both in terms of infrastructure and teacher competence. Technology-based learning is part of school culture.

Source: Author Documentation 2025

Based on **Table 1**, it can be seen that teachers from various levels of education provide diverse but generally positive views on coding and Artificial Intelligence (AI) learning. In terms of *performance expectancy*, elementary school teachers consider that this learning can improve digital literacy and train students' logic and creativity from an early age. Junior high school teachers view it as very relevant and practical in shaping the algorithmic mindset

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of students. At the high school level, learning coding and Artificial Intelligence (AI) is considered important as a career provision and readiness to face the digital era. Meanwhile, vocational school teachers said that this is not new because most vocational schools have implemented it, so this policy strengthens the programs that are already available. In terms of *effort expectancy*, public elementary school teachers face significant challenges due to technical limitations of students, infrastructure, and the competence of teachers who are generally classroom teachers. On the other hand, in private elementary schools, implementation is more straightforward because the facilities are adequate and teachers already have the competence to teach coding and Artificial Intelligence (AI). Junior high school teachers stated that obstacles only occur in the early stages, and if there are clear modules, then implementation is relatively easy. High school teachers consider that coding and Artificial Intelligence (AI) learning is relatively easy to do as long as there are supporting devices and curricula, considering that students already have a digital foundation. Vocational school teachers said that this approach had been prevalent before the existence of an official policy.

From the perspective of *social influence*, public elementary school teachers revealed that the school environment has not fully supported implementation, depending on individual initiatives. On the contrary, private elementary schools received strong support from the management and the school community. In junior high school, pressure comes from the office and the environment, although not all teachers are supportive. High school shows that there is quite intense social pressure from the technology teacher community because of the digitalization target. Vocational schools have full support from management and the vocational community, and even initiatives have emerged before policies are issued. Finally, in the aspect of *facilitating conditions*, public elementary schools still face limited infrastructure, such as computers and internet networks, as well as a lack of teacher training, in contrast to private elementary schools, which have adequate facilities and teacher training available. At the junior high school level, the infrastructure is reasonably available with the existence of a school IT team that assists in technical implementation. High schools had limited, but sufficient facilities, and institutional support began to take shape. In vocational schools, support is firm both in terms of infrastructure and teacher competence, because technology-based learning has become a school culture.

Discussion

In general, teachers at all levels of education convey positive expectations for the benefits of coding and Artificial Intelligence (AI) learning (*performance expectancy*) (Venkatesh *et al*, 2012). Elementary school teachers, both in public and private schools, believe that this learning can improve digital literacy and students' logical thinking skills from an early age. Junior high school teachers emphasized the importance of learning coding to develop an algorithmic mindset and cultivate digital skills. High school and vocational school teachers stated that mastery of coding and Artificial Intelligence (AI) is a strategic provision for the future of students, especially in the world of work and universities. These findings confirm previous findings that emphasize the importance of the introduction of *computational thinking* and algorithmic logic in primary and secondary education (Kong *et al*., 2018). In addition, the OECD and the Ministry of Education emphasized that technology learning, such

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as training, supports critical digital literacy and creativity, two key competencies of the 21st century. This hope is also in line with the views of several experts who stated that the curriculum must instill an understanding of technology in a social context so that students are able to actively participate in an increasingly digitized society (Lye & Koh, 2014). The implication is that positive expectations of teachers become a strong initial foundation for the success of policy implementation if supported by an adequate support system.

However, the level of ease felt in implementing this policy (*effort expectancy*) varies significantly between levels and types of schools (Venkatesh *et al.*, 2012). Public elementary school teachers face major obstacles related to the lack of students' skills in using digital devices, as well as limited training and operational guidance. On the other hand, private elementary school teachers show better readiness because internal facilities and training support them. Junior and senior high school teachers stated that their students were relatively familiar with technology, and training learning became easier with the modules and support from the school's ICT team. Vocational school teachers said that train learning had been routinely carried out before the national policy was enforced. These findings reinforce that teachers' pedagogical and digital readiness significantly affects the effectiveness of the use of learning technology (Valtonen *et al*., 2015). Furthermore, the success of technology-based curriculum is highly dependent on teachers' readiness to adopt a constructivist approach, namely by prioritizing direct and contextual experiences in learning. The connectivity approach is also relevant, where technology-based learning requires teachers and students to be able to explore digital knowledge networks independently.

The social *influence aspect* shows that encouragement from the social environment plays an important role in shaping teacher motivation (Venkatesh *et al*, 2012). Public elementary school teachers said that there was no explicit support from school leaders or peers. In contrast, private elementary school teachers stated that they had strong support from the principal and parents of students. Junior and senior high school teachers acknowledge the encouragement of the teacher community and the education office. In contrast, in vocational schools, social influence is powerful because it has been built in the culture of the institution. These findings corroborate UTAUT's theory that social pressure has an important role in driving significant technological acceptance (Dwivedi *et al*., 2019). The social environment and values formed by the school also influence the direction of the curriculum and the teacher's attitude towards change. In the context of KA learning, *social influence* does not only come from school leaders, but also from official policies, information from teacher forums, and parents' expectations. Therefore, it is important to strengthen a collaborative culture and transformational leadership in schools, as emphasized in the humanistic approach. The category *of facilitating conditions* is an important determinant in the implementation of coding and Artificial Intelligence (AI) learning (Venkatesh *et al*, 2012).

Public elementary school teachers face limited devices, unstable internet networks, and the absence of systematic training. On the other hand, private schools already have enough computer labs and access to training. At the junior high and high school levels, the condition of the facilities is considered quite adequate, especially with technical assistance from the school IT team. In vocational schools, institutional support and infrastructure have even taken root. This condition reflects the importance of responsive and local needs-based policy orchestration. These findings are consistent with the opinion that structural factors such as resources and institutional support should be designed to empower teachers in addressing

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the needs of today's curriculum. Further, these results are reinforced by research that also underscores the importance of principal involvement and collaboration with the local EdTech community in ensuring the sustainability of learning technology implementation (Inayah *et al*., 2024). Furthermore, this discussion emphasizes that coding and Artificial Intelligence (AI) learning in Indonesia cannot be implemented uniformly. A differential approach is needed based on the readiness of the educational unit and the socio-economic background of the students. This is also confirmed by a number of studies that criticize the failure of digital program implementation that is not based on local needs. When compared to South Korea and Australia, which have implemented artificial intelligence holistically in primary education through support from various sectors (Kim & Kwon, 2023; Lee & Jeong, 2023).

Indonesia still needs to build a foundation of infrastructure and teacher training more widely and evenly. Referring to the international approach and adapting it to the local context as suggested by the Ministry of Education, coding and Artificial Intelligence (AI) policies in Indonesia have the opportunity to become a national strategy in producing a generation of digital learners who are adaptive and globally competitive. This discussion comprehensively answers the general and specific objectives of research, and emphasizes that the four UTAUT constructs interact with each other in shaping teachers' readiness and acceptance of coding and Artificial Intelligence (AI) learning policies. These findings also show that the scope of the research, which includes teachers from elementary, junior high, to high school/vocational school in the city of Bandung, reflects complex and diverse actual conditions. These results enrich theoretical understanding of the acceptance of technological innovation in education, and provide a practical basis for the development of teacher training strategies, strengthening differential policies, and providing sustainable and equitable educational infrastructure.

CONCLUSION

This study revealed that teachers from various levels of education showed a positive attitude towards coding and Artificial Intelligence (KA) learning policies in the Merdeka Curriculum. This reflects their belief in the contribution of learning to improving digital skills, logic thinking, and students' readiness to face technological challenges in the future. However, the readiness for the implementation of this policy is still very diverse, especially at the public elementary level which experiences obstacles in terms of the availability of devices and technological competence. On the other hand, private schools and junior high school to vocational schools tend to be better prepared because they have access to facilities and training. The findings confirm that social support from the education community plays a central role in driving the adoption of these policies. In addition, implementation readiness is highly dependent on the availability of facilities, training, and technical assistance. Inequality between schools indicates the importance of a policy approach that is more contextual and adaptive to the conditions of each educational unit. The follow-up study suggests that the government and the education office design a continuous training program based on the needs and level of mastery of teachers technology, especially in public elementary schools. The preparation of coding and Artificial Intelligence (AI) learning curricula and modules also needs to be carried out systematically and inclusively. Schools are expected to build a collaborative ecosystem with transformative leadership to support

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innovation. On the other hand, efforts to equitably distribute educational infrastructure are urgent to ensure justice in digital transformation at all levels of education.

AUTHOR'S NOTE

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