



TADULAKO JOURNAL SPORT SCIENCES AND PHYSICAL EDUCATION
PHYSICAL EDUCATION, HEALTH, AND RECREATION STUDY PROGRAM
EDUCATION SCIENCE DEPARTMENT
TADULAKO UNIVERSITY, PALU, INDONESIA
<https://jurnal.fkipuntad.com/index.php/tjsspe/index>
E-ISSN 2581-0383 | P-ISSN 2337-4594



THE APPLICATION OF GENERATIVE AI BY PHYSICAL EDUCATION TEACHERS: A UTAUT PERSPECTIVE ON LEARNING TRANSFORMATION

***Ashari Efendi¹, Ranti Maulya², Kamarullah³, Nopri Abadi Miko⁴, Amrizal⁵**

^{1,2,4,5}Universitas Muhammadiyah Mahakarya Aceh, Indonesia

³Sekolah Menengah Atas Negeri 16 Banda Aceh, Indonesia

*Correspondence: ashariefendi1990@gmail.com

Article History: Accepted July 2026, Approved August 2026, Published September 2026

ABSTRAK

The fast-evolving generative artificial intelligence (GenAI) has opened up new possibilities for changing the nature of teaching; nevertheless, there is a lack of empirical data on how physical education teachers can implement and integrate GenAI into their work. This research aimed to investigate how physical education teachers adopt GenAI in their teaching practice, focusing on their perceptions, usage patterns, and experiences, based on the Unified Theory of Acceptance and Use of Technology (UTAUT). This was done using open- and closed-ended questionnaires that comprised 66 physical education teachers from Aceh Tengah Regency, Bener Meriah Regency, Aceh Besar Regency, and Banda Aceh Municipality in Indonesia. The UTAUT-based questionnaire, comprising six constructs and open-ended questions, was used to collect data. The quantitative data were analyzed using descriptive statistics, and the qualitative responses were analyzed using thematic analysis. The findings showed positive adoption of GenAI and, in particular, behavioral intention and performance expectancy. ChatGPT, Gemini, and Meta AI were the most popular, as they are the most accessible and well-known. What is even more, the study identified a three-phase instructional integration of GenAI that comprises pre-teaching activities, such as lesson planning, development of materials, and preparation of assessment; whilst-teaching activities, such as visual learning support, organization of the content and the use of multimedia materials; and post-teaching activities, such as reporting, documentation and program management. These findings indicate that GenAI is now more of an additional technology and a prospective instructional and administrative aid in the teaching process. The analysis explains that the policies would be critical in increasing AI literacy, infrastructure, and professional development of physical education educators. By demonstrating how GenAI could be used to support instructional processes across different teaching levels, this research paper contributes to current knowledge on the responsible use of AI in physical education and teachers' professional practice globally.

Keyword: Artificial Intelligence, Generative AI, Physical Education, Teaching Practices, UTAUT

OPEN ACCESS  Copyright © 2026 by author/s

INTRODUCTION

The fast pace of generative artificial intelligence (GenAI) has changed the way education is conducted across the globe considerably, especially after the advent of ChatGPT and other applications based on large-language-model algorithms. The kind of artificial intelligence capable of producing human output in the form of texts, lesson plans and instructional materials, assessments and learning activities in response to user prompts is referred to as GenAI. Educational institutions have become actively exploring what ChatGPT offers in the areas of teaching, learning, assessment, and professional development since the public release of ChatGPT in late 2022 (Baidoo-anu & Ansah, 2023). Recent studies underscore the fact that GenAI technologies are gradually becoming a common feature in various learning settings due to their ability to streamline efficiency, creativity, and accessibility in the process of teaching and learning (Jin et al., 2025; Monib et al., 2024). In the meantime, educators continue to grapple with the problems of ethical considerations, digital literacy, academic integrity, and technological readiness (Rasool et al., 2025). Besides the overall education environment, GenAI has also provided additional development of digital pedagogy in sports and physical education. Intelligent technologies are more and more common in contemporary digital pedagogy to help organize instruction, track movement, provide feedback on performance, create multimedia learning resources, and interact with students.

In line with this, GenAI is beginning to be viewed as not only a technological resource, but also a pedagogical resource that can be applicable to improve the teaching and learning experience in sports-related learning contexts. Nevertheless, even with such possibilities, the implementation of AI in physical education is not balanced. At the moment, physical education teachers still use traditional methods of instruction that are based on direct demonstration, observation, and direct face-to-face coaching interactions. Consequently, the scope of the adoption, adaptation, and integration of AI technologies into daily physical education practices is not well understood, especially in the context of developing countries, where infrastructure, training possibilities, and digital preparedness might differ significantly. The rise of GenAI has spawned much interest among educators, who can use the technologies to plan lessons or design instructional materials, design learning assessments, and even provide personalized instructional support. Previous studies have shown that educators have become more appreciative of AI as one of the approaches to assist them with reduced administrative tasks and teach more effectively (Deshen et al., 2026).

Moreover, GenAI applications can help teachers to receive immediate pedagogical recommendations, customize learning material, and create new classroom exercises more effectively than traditional approaches (Prilop et al., 2025). Therefore, the use of AI has already emerged as one of the most important technological trends that impact modern educational practice. But even more recent studies indicate that there are no problems with the adoption of AI that come without difficulty. Teachers are still facing obstacles pertaining to AI competence, instructional adaptation, digital literacy, and creation of relevant teaching resources (Ilma & Rohmah, 2025). Further indicators from developing countries also suggest that capacity limits, cost factors, and lack of skills remain key hindrances to effective AI teaching and learning (Ibrahim et al., 2026). These problems can be exacerbated by the nature of physical education teaching when outdoor and field learning makes it more difficult to sustain a constant internet connection, access to digital devices, and the use of real-time technologies than in regular classroom environments. In turn, the implementation of AI-assisted resources in physical education can entail further technological preparedness and contextual modification. In addition to this, the problem of the reliability of the AI-generated findings, ethics, and institutional readiness may also become obstacles on the way to successful implementation, particularly when it comes to the educational environment where the prospects of accessing technological support and professional development are limited (Rasool et al., 2025).

Over the past few years, one can note that teachers are increasingly interested in applying GenAI to assist with lesson planning, content development, and classroom instruction. To

illustrate this, Kamarullah et al. (2024) determined that AI writing tools proved to be conducive to instructional preparation among rural English educators, yet technology literacy and responsible use-related concerns did not go away. Similarly, Kamarullah, Fadhilah, et al. (2024) have established that AI-based pedagogical strategies and blended learning strategies were more effective in enhancing the flexibility of instruction in rural schools. These results indicate that GenAI has great potential to assist teachers in many fields, such as physical education, where instructional planning and learning material creation can take much time and effort.

The implementation of GenAI in learning institutions is still skewed, though it is becoming more popular. Research shows that the willingness to use AI is influenced by a variety of factors, among which readiness to use technologies, perception of usefulness, ease of use, institutional support, technological infrastructure (Gamlem et al., 2026), and the possibility of professional training are the most mentioned (Ghimire et al., 2024). These findings imply that the successful application of AI is not entirely dependent on the availability of technologies but also on the mindset and desire of teachers to incorporate AI in their educational process. The use of artificial intelligence in the sphere of physical education has gained growing academic interest. Sports analytics, performance monitoring, biomechanics, coaching, skill development, and promoting health are the areas where AI technologies have been applied. Recent developments have increased the use of AI beyond the performance of sports to teaching support and teaching innovation. As an example, AI-based teaching tools are said to enhance the learning experience, provide intelligent feedback, and facilitate individualized learning when applied in the field of sports education (Song, 2024). In the same vein, Konukman et al. (2025) reiterated that AI has significant potential to enhance the effectiveness of teaching in the context of health and physical education by aiding in lesson planning, assessment planning, and student interaction.

Although the literature regarding the application of AI in education has increased at an extremely high rate, there is extremely scanty research on the application of generative AI by physical education educators. There is quite a narrow range of literature on the topic, mostly concerning the context of higher education, student-perceived aspects, institutional policy, or the views of teachers on AI as a whole (Jin et al., 2025; Rasool et al., 2025). In addition, numerous studies focus on technological abilities and system functionality (Saputra et al., 2026; Sukmawana et al., 2026) instead of personal experiences and behavioral intentions of teachers about the use of AI in teaching. On a broader international front, AI adaptation studies have mainly focused on the cognitively based areas of education like language learning, writing, assessment and academic achievement, but physical education has been relatively understudied. This is an essential gap since, in comparison with other educational areas, physical education has historically been based on direct instruction, demonstrating movements, coaching relationships, and experiential learning, so it is one of the educational fields in which technology-mediated instruction has emerged more slowly (Konukman et al., 2025; Wang & Wang, 2024).

Physical education, in contrast, needs to be based on multimodal learning experiences which include visual observation, physical movement, performance of motor skills and instant performance feedback, unlike most classroom-based subjects where the main emphasis is laid on the cognitive processes. Such a visual-motor integration presents special pedagogical challenges that can influence how teachers view, adopt and apply AI technologies in pedagogy. Therefore, there is a paucity of evidence on how educators incorporate AI in learning settings that concomitantly target cognitive, affective and psychomotor learning outcomes. By focusing on physical education teachers, the current research contributes to the already existing AI adoption literature of mainly cognitive learning environments and empirically examines AI adoption in the psychomotor domain, where the instruction and pedagogical processes and requirements are very different compared to the traditional classroom subjects.

Though the adoption of AI by English teachers, lecturers, and educational practitioners has been explored in previous Indonesian studies (Kamarullah, Fadhilah, et al., 2024; Kamarullah, Sarinauli, et al., 2024), it has not targeted physical education teachers. The available data is primarily based on the setting of language education and universities, which induces uncertainty regarding the existence of the same patterns of adoption in the environment of

physical education teachers, when the pedagogical task they have to address has high levels of psychomotor teaching and activities-based learning. This situational gap needs to be investigated further. The Unified Theory of Acceptance and Use of Technology (UTAUT) developed and synthesized by Venkatesh et al. (2003, 2016) is a theoretical framework that will be suitable to investigate the context of technology adoption in the educational environment. The UTAUT model postulates that technology acceptance is determined by performance expectancy, effort expectancy, social influence, and facilitating conditions. The constructs have been extensively used in studies on the adoption of emerging technologies by educators as they are effective in describing the behavioral intentions and actual use of technology. Using GenAI, UTAUT makes it possible to examine not only the perceptions of teachers towards AI as something useful and easy to work with but also how the support offered by an institution and technological infrastructure can influence the choice to adopt AI.

The use of popular applications such as ChatGPT, Gemini, Meta AI and DeepSeek has sparked a debate on the adoption of AI in education in Indonesia. Educators are getting more and more chances to use such technologies in terms of instructional preparations, content development, test design, and administration. However, access to technology, digital skills, training access, and institutional facilitation may have an effect on adoption by region. The experiences of the teachers with generative AI are especially important in some provinces, such as Aceh, where the educational institutions vary considerably in terms of infrastructure and technological readiness, to guide subsequent educational policies and the professional development program. The use of ChatGPT and teaching with AI is also a research topic on the use of generative AI that has become increasingly popular in Indonesia among teachers. Incidentally, research by Istiarsyah et al. (2025) observed the platform in supporting the development of teachers in terms of their skills and lesson module design, which indicates the rising adoption of AI-assisted instructional activities among Indonesian teachers. Nonetheless, there is a dearth of empirical evidence of AI uptake among physical education teachers, predominantly in some areas of the country that are not in major urban centres.

Though the application of AI-assisted education is becoming more and more significant, the role of generative AI in the Indonesian school education system applied by physical educators is not thoroughly examined. In addition, little is known about the view of benefits, challenges and supportive aspects of AI application among physical education teachers in their teaching process. This is an area that should be bridged because one of the determinants of successful implementation of educational technologies is the perception and experience of teachers. In this way, this study aims to investigate how teachers of physical education will use generative AI in teaching and how they will apply it considering the performance expectancy, effort expectancy, social influence, facilitating conditions, actual use, and intentions to use AI in teaching.

METHOD

Research Design

A survey was employed in this study to investigate how the physical education teachers in this study adopted GenAI in their teaching. One of the tools applied in the paper was the UTAUT, which was developed by Venkatesh et al. (2003) and was further modified by Venkatesh et al. (2016). The model explains the adoption of technology in four key constructs that include: performance expectancy, effort expectancy, social influence, and facilitating conditions. Besides, this study entailed actual AI application and the willingness to apply GenAI more in the learning institutions. UTAUT was chosen due to its ability to combine the key determinants of some of the previous technology acceptance models such as the Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB) and Diffusion of Innovation Theory, and thus it offers a more comprehensive model to explain the technology adoption behavior of educators (Venkatesh et al., 2003). As the use of GenAI will not only be subject to the perceptions of usefulness and ease of use, but also institutional and social factors, UTAUT was considered particularly suitable to study how teachers will embrace the new AI technologies.

This study employed a convergent mixed-methods research design, in which the quantitative and qualitative data were gathered simultaneously with the help of the same questionnaire. This questionnaire was selected as it enables the researchers to collect data on their perceptions, experiences and behaviors in using technology, in a fairly large sample. The quantitative section was the closed-ended questions, which measured UTAUT constructs, and the qualitative section was the open-ended questions, which were meant to capture the experiences, gains, challenges and perceptions of the participants in the use of GenAI. An amalgamation of the two data sources, the study sought to get a better idea about the uptake of GenAI by the physical education teachers than could have been the case when only one method was used.

Participants and Sampling

The target group was the physical education teachers of secondary schools in Aceh Province in Indonesia. The convenience and snowball sampling methods were used to recruit participants at the forums of teachers. These methods have been chosen due to their ability to effectively reach teachers via professional networks, teacher associations and learning communities. The inclusion criteria consisted of three parts, namely (1) currently teaching physical education at the junior high school, senior high school, or vocational high school level; (2) having at least one year of teaching experience; and (3) having familiarity with or experience using generative AI tools such as ChatGPT, Gemini, Meta AI, DeepSeek, Copilot, Claude, or similar applications. As a result, the study involved 66 respondents from several regions of Aceh Province, including Aceh Tengah Regency, Bener Meriah Regency, Aceh Besar Regency, and Banda Aceh Municipality. Participation was voluntary, and all respondents provided informed consent before completing the questionnaire.

Data Collection

Instrumentation

A structured online questionnaire that was developed with the help of Google Forms was used to collect data. The demographic details of the participants (gender, age, teaching experience, school level, school status, school location, educational qualification, experience in AI training, frequency of AI use and AI applications used) were gathered at the onset of the questionnaire. The questionnaire was then split into two sections: the UTAUT scale (to examine the perception of the respondents to GenAI adoption) and the open-ended questions (to address the gaps in the qualitative outcomes), as in Table 1.

Questionnaire Sections	Details	Number of Items
UTAUT scale	Performance expectancy (PE)	5
	Effort expectancy (EE)	5
	Social influence (SI)	4
	Facilitating conditions (FC)	5
	Actual use (AU)	5
	Behavioral intention (BI)	4
Open-ended questions	Current AI utilization practices	1
	Perceived benefits of AI	1
	Challenges encountered	1
	Ethical concerns regarding AI	1
	Professional development needs	1
	AI use for preparing instructional materials	1

Table 1. Questionnaire Details

Instrument Validation

Prior to actual data collection, the questionnaire was skillfully tested. Two specialists, i.e., an educational technology specialist and a physical education specialist, evaluated the instrument. The validators went through the questionnaire to check its relevance to the content,

clarity, use of appropriate language, and construct representation. It was proposed that some of the experts would come up with some suggestions on the way to improve the instrument, which was done. In terms of reliability, a pilot study on a small group of physical education teachers was later conducted to establish the possibility of ambiguity and how much time it takes to complete it. Changes were made according to the suggestions of the participants.

Data Collection Procedure

The online data collection was conducted in Google Forms. The questionnaire link was provided through the teacher professional circles, school communication systems and WhatsApp groups. The subjects were first taken to an informed consent form, which informed them about the objective of the research, the confidentiality procedure, voluntary involvement, and the estimated time of the research. Participants were only allowed to go through the questionnaire after giving consent. To ensure privacy, no personally identifiable information was gathered. Automatic recording and storage of responses was done in a password-protected database, which could only be accessed by the researchers. The procedure of the research is shown in Figure 1.

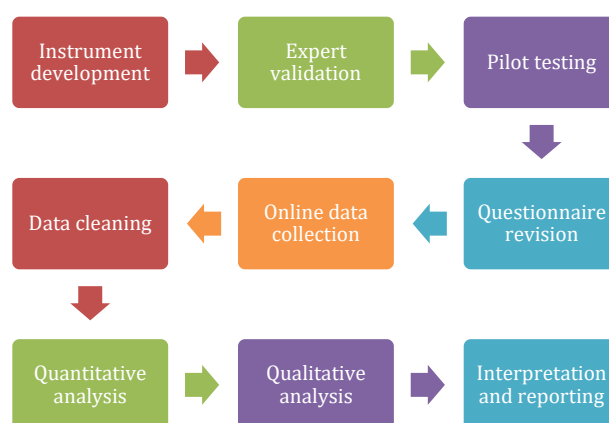


Figure 1. Research procedure

Data Analysis

The quantitative data were analyzed with the help of IBM SPSS Statistics. The internal consistency of the questionnaire was established by using Cronbach's alpha prior to the actual analysis. The results indicated that all constructs were highly reliable with 0.80 to 0.87 Cronbach alpha coefficients. The overall scale reached a good internal consistency and reliability (Cronbach alpha of 0.84) in measuring the use of GenAI by physical education teachers (Taber, 2017). Table 2 shows detailed reliability coefficients of each construct.

Constructs	Number of Items	Cronbach's alpha
PE	5	0.86
EE	5	0.84
SI	4	0.80
FC	5	0.83
AU	5	0.87
BI	4	0.85
Overall instrument	28	0.84

Table 2. Reliability Analysis of the Instrument

The responses of the participants were then described using statistical methods by giving frequencies, percentages, means and standard deviations. In order to make it easier to interpret, mean scores were categorized as depicted in Table 3.

Mean Range	Interpretation
4.21 – 5.00	Very high
3.41 – 4.20	High
2.61 – 3.40	Moderate
1.81 – 2.60	Low
1.00 – 1.80	Very low

Table 3. Mean Scores

Braun and Clarke (2022, pp. 84–95) analyzed qualitative answers with the help of the open-ended questions. 84–95) six-stage framework of thematic analysis. The procedure involved familiarization with the data, preliminary coding, theme creation, theme evaluation, theme definition, and writing of the report. This procedure helped to identify some common trends as per the benefits, concerns, problems and support demands that are associated with using GenAI.

Thematic analysis method of Braun and Clarke (2006), namely, with the six-phase analysis framework applied, was used to analyze qualitative responses to the open-ended questions (Braun & Clarke, 2022, pp. 84–95). These stages included familiarizing themselves with the data, initial coding, theme development, theme review, theme definition and report writing. This enabled the discovery of similar patterns in terms of the benefits, challenges, concerns, and support needs of GenAI adoption.

Ethical Considerations

The paper followed the ethical standards in conducting research in the field of education. Participation was voluntary, and informed consent was necessary before participating in the activity; the respondents were not subjected to consequences should they wish to pull out. No personally identifiable information was obtained, and all the data were summarized to ensure confidentiality and anonymity.

Furthermore, the use of GenAI tools has been undertaken to assist with the creation of questionnaires, optimization of languages, and pre-classification of qualitative answers. However, all the decisions in the research were made by the authors; the instrument was validated, the data interpreted, coded and the manuscript prepared by the researchers, which were verified by the researchers. The authors assume complete responsibility for the research accuracy, originality and integrity.

RESULTS

Demographic Characteristics of Respondents

A total of 66 physical education teachers were involved in this study. The sampling was done in four territories in Aceh Province: Aceh Tengah Regency (30.3%), Aceh Besar Regency (27.3%), Bener Meriah Regency (24.2%), and Banda Aceh Municipality (18.2%). The majority of the respondents were male (95.5%), and a minority of female teachers made up 4.5% of the sample. The age groups, teaching experience, and frequency of GenAI-use were quite balanced in categories. The demographic information of the respondents is shown in Table 4.

Variable	Category	Frequency (f)	Percentage (%)
Gender	Male	63	95.5
	Female	3	4.5
Age	Under 30 years	9	13.6
	30–39 years	22	33.3
	40–49 years	24	36.4

Variable	Category	Frequency (f)	Percentage (%)
Teaching Experience	50 years and above	11	16.7
	Less than 5 years	8	12.1
	5–10 years	17	25.8
	11–20 years	26	39.4
	More than 20 years	15	22.7
School Level	Junior High School (SMP/MTs)	31	47.0
	Senior High School (SMA/MA)	22	33.3
	Vocational High School (SMK)	13	19.7
School Status	Public	55	83.3
	Private	11	16.7
School Location	Urban	34	51.5
	Rural	32	48.5
Educational Qualification	Bachelor's Degree	48	72.7
	Master's Degree	18	27.3
AI Training Experience	Never	21	31.8
	Once	19	28.8
	2–3 Times	17	25.8
	More than 3 Times	9	13.6
Frequency of AI Use	Rarely	16	24.2
	Sometimes	25	37.9
	Often	18	27.3
	Very Often	7	10.6
Region	Aceh Tengah Regency	20	30.3
	Bener Meriah Regency	16	24.2
	Aceh Besar Regency	18	27.3
	Banda Aceh Municipality	12	18.2

Table 4. Demographic Characteristics of Respondents

The demographic overview shows that teachers of various age groups and degrees of teaching experience have adopted generative AI. The equal balance indicates that the adoption of AI is not restricted to younger teachers, but is also present in more experienced teachers.

Adoption of GenAI Among Physical Education Teachers

As shown in Table 5, the descriptive analysis revealed generally positive perceptions toward GenAI adoption. All UTAUT constructs achieved mean scores within the high category.

Construct	Mean	Category
PE	4.12	High
EE	3.91	High
SI	3.65	High
FC	3.70	High
AU	3.87	High
BI	4.18	High
Overall mean	3.89	High

Table 5. Descriptive Statistics of UTAUT Constructs

BI obtained the highest mean score ($M = 4.18$), followed by PE ($M = 4.12$). Such findings indicate that the participants had been convinced that GenAI was a useful tool and had great intentions of using GenAI in their work. Conversely, SI scored the lowest ($M = 3.65$), which can be interpreted as the engagement of teachers in adopting GenAI being more driven by personal, but not institutional factors.

GenAI Applications Used by Physical Education Teachers

Respondents reported using a variety of GenAI applications for teaching-related purposes. The accumulation of the responses is showcased in Table 6.

GenAI Tool	Frequency (f)	Percentage (%)
ChatGPT	58	87.9
Gemini	42	63.6
Meta AI (WhatsApp)	39	59.1
DeepSeek	11	16.7
Microsoft Copilot	8	12.1
Claude	3	4.5
Perplexity	2	3.0

Table 6. GenAI Applications Used by Physical Education Teachers

ChatGPT emerged as the most widely used AI application, as 87.9% of the respondents use it. The adoption rates of Gemini (63.6%) and Meta AI embedded into WhatsApp (59.1%) were also high. DeepSeek, Copilot, Claude, and Perplexity, on the other hand, were not very numerous among respondents. The results show that the physical education teachers are more likely to use AI tools that are easily accessible and which are incorporated into digital platforms already embedded within their everyday professional activities. The high visibility, accessibility, and the ability to use ChatGPT and Gemini in an instructional setting (lesson planning, preparing materials and creating assessments) may explain their popularity. Interestingly, the usage rate was quite high at Meta AI (59.1%), which indicates that AI functions are actively used by teachers in WhatsApp, one of the most popular communication tools among Indonesian teachers.

Socioculturally, the trend presupposes that the physical education teachers may be more engaged in AI applications that do not imply numerous alterations in their existing communication and working patterns. Instead of utilizing dedicated AI tools, a big proportion of respondents seemed to employ technologies that were directly embedded into commonly used online platforms. This finding implies that accessibility, convenience, and connection with daily communication equipment may play important roles in influencing AI adoption among physical education teachers.

GenAI Utilization Across Teaching Stages

Respondents were asked to indicate how they employed generative AI before, during, and after teaching activities (see Table 7).

Teaching Stage	Purpose of Use	Frequency (f)	Percentage (%)
Pre-teaching	Preparing lesson plans (ATP/Modul Ajar)	54	81.8
	Developing teaching materials	49	74.2
	Creating exercises and assessments	45	68.2
Whilst teaching	Generating instructional images and illustrations	40	60.6
	Searching or producing educational videos	37	56.1

Teaching Stage	Purpose of Use	Frequency (f)	Percentage (%)
Post-teaching	Creating mind maps and learning summaries	31	47.0
	Utilizing NotebookLM for content organization	27	40.9
	Preparing intracurricular reports	35	53.0
	Preparing extracurricular and coaching reports	29	43.9
	Writing reflections and activity documentation	24	36.4

Table 7. Purposes of GenAI Use Across Teaching Stages

The results suggest that the most frequent use of GenAI was at the stage of preparing the instruction. Over four-fifths of the respondents engaged AI in lesson planning, and about three-quarters of the respondents used AI to create instructional resources. In a classroom setting, AI was largely used by educators to aid visual learning materials and to provide information. The use of AI in the post-teaching stage was mostly for administrative reporting and documentation.

Dominant Themes Emerging from Open-Ended Responses

The qualitative findings were organized into three dominant themes that complemented the quantitative results presented in Table 8.

Theme	Subtheme	Respondents (n)	Percentage (%)
GenAI as an instructional support tool	Lesson planning	54	81.8
	Teaching materials	49	74.2
	Assessment development	45	68.2
	Visual learning resources	40	60.6
GenAI as an administrative support tool	Intracurricular reporting	35	53.0
	Extracurricular reporting	29	43.9
Challenges in GenAI adopting	Accuracy concerns	26	39.4
	Internet limitations	21	31.8
	Lack of training	18	27.3

Table 8. Dominant Themes Emerging from Open-Ended Responses

Theme 1. GenAI as an Instructional Support Tool

The strongest theme related to the application of GenAI to aiding instructional activities. As indicated in Table 5, 54 respondents (81.8%) had lesson plans, 49 respondents (74.2%) teaching materials, and 45 respondents (68.2%) assessments that were developed using GenAI.

One respondent explained:

"AI helps me prepare lesson plans much faster. I usually generate learning objectives, activity steps, and assessment rubrics before adapting them to my students' characteristics." (R17, Male, 30–39 years, Aceh Tengah)

Similarly, another respondent highlighted the usefulness of GenAI in generating visual learning resources:

"I often use AI-generated images and videos to explain movement techniques because students understand visual demonstrations more easily than written explanations." (R58, Male, 40–49 years, Banda Aceh)

Several respondents also identified a newcomer to GenAI, NotebookLM, as a useful tool for organizing teaching resources.

"NotebookLM helps me summarize curriculum documents and organize learning materials before class." (R41, Male, 30–39 years, Aceh Besar)

Theme 2. GenAI as an Administrative Support Tool

The second dominant theme concerned the use of GenAI to reduce administrative workload. As shown in Table 4, 35 respondents (53.0%) used AI to prepare intracurricular reports, while 29 respondents (43.9%) employed GenAI to prepare extracurricular and coaching reports.

One respondent voiced:

"Preparing reports for school activities takes considerable time. AI helps organize the narrative sections and summarize activities more efficiently." (R39, Female, 50+ years, Aceh Besar)

Another respondent reported:

"I use GenAI to prepare reports for sports competitions and extracurricular programs. It reduces repetitive writing tasks." (R57, Female, 30–39 years, Banda Aceh)

Theme 3. Challenges in GenAI Adoption

Despite positive perceptions, respondents also identified several challenges. Accuracy concerns were reported by 26 respondents (39.4%), followed by internet connectivity limitations (31.8%) and insufficient training opportunities (27.3%).

One respondent stated:

"I always verify the information generated by GenAI because some recommendations are not relevant anymore with the textbooks available at my school." (R24, Male, <30 years, Bener Meriah)

Similarly, another respondent highlighted infrastructure-related difficulty.

"Internet access is sometimes unstable, especially when teaching in rural areas. This limits how often I can use AI applications." (R31, Male, 50+ years, Bener Meriah)

Overall, the qualitative findings support the quantitative ones, demonstrating that most physical education teachers believe that GenAI is a tool that can be used to enhance the preparation process of instruction and relieve the load on administration. However, the problems of accuracy of information, infrastructure, and professional development can still be noticed in a large percentage of the respondents.

DISCUSSION

This study examined how GenAI can be adopted by physical education teachers into their own teaching practice by investigating their perceptions, actual use and experiences of GenAI use using the UTAUT model. The findings revealed that physical education instructors were largely receptive to GenAI, in particular, their intentions to utilize AI technologies and the way they perceived it as helpful. More to the point, the results show that GenAI uptake in physical education teachers is not just a mere case of experimentation with new technology. Rather, educators have started to incorporate AI into various aspects of instructional practice such as lesson planning, classroom instruction, and administration.

There is a high behavioral intention, which means that teachers in physical education believe that GenAI can be implemented as a feasible component of their teaching in the future. This result confirms the idea of the UTAUT framework that lessens the chances of people adopting technology when they feel that it has a substantial value in its use (Venkatesh et al., 2003, 2016). Interestingly, the behavioral intention of teachers was greater than other variables of adoption, which implies that the intention to continue the use of AI can be formed even in the case of limited institutional support and formal training. This outcome is an extension of previous

research, which indicates that teachers are increasingly integrating AI tools because they find it useful in workload management, creativity in instruction, and teaching (Prilop et al., 2025; Rasool et al., 2025).

The positive attitude and behavioral intention of the research at hand may be likened to the findings in the developed school contexts where teachers have increasingly to the application of GenAI in their curriculum design, in their assessment design, and in their professional learning activities (Jin et al., 2025; Prilop et al., 2025). These trends have been repeated in the context of physical education and sports education, wherein AI technologies are being explored to facilitate teaching effectiveness, personal learning, and guidance-building innovation (Konukman et al., 2025; Wang & Wang, 2024). Nevertheless, in contrast to most developed-country contexts where AI implementation is often facilitated by institutional policies, formalized professional development, and pre-existing digital infrastructures, interviewees in the current study seemed to have to do more experimentation and self-directed learning. This difference implies that the global benefits of AI might be perceived in a similar way, but the direction in which teachers embrace AI technologies is influenced by the local educational ecosystem and support systems.

Performance expectancy was also one of the most effective factors that could influence the adoption of GenAI among the teachers of physical education. Teachers saw AI as useful as it facilitated key professional activities such as lesson planning, creation of teaching resources, creation of assessment materials and content organization. The same observations were made by Jin et al. (2025), who have claimed that teachers are starting to see GenAI as an aiding tool that can help to make teaching more productive. The present paper goes further to build on this knowledge by demonstrating that these benefits are not just limited to text-based courses or to a higher education environment but equally to physical education where teachers need to learn how to integrate cognitive knowledge, physical activity and skill-based learning experiences.

Integration of GenAI into the pre-teaching stage was the most prevalent practice that was found during this study. The main uses of AI in physical education teachers are lesson plans, creation of learning materials and generation of tests. This result indicates that AI implementation is tightly linked with the efforts of teachers to cope with the growing needs of instructional preparation. Past research with Indonesian teachers has also indicated that AI-driven solutions can help teachers to create teaching resources and change learning resources based on classroom requirements (Istiarsyah et al., 2025; Kamarullah, Fadhilah, et al., 2024). Thus, GenAI is not designed to substitute the pedagogical functions of teachers but rather is a helping tool that allows them to spend more time on instructional decision-making and interaction with students.

Besides the preparation of the lesson, another aspect of this study that came out clearly is that GenAI has now begun to impact the implementation stage of the teaching process, namely, the visual and multimedia-based learning support. Among the variations between physical education and other academic subjects, in most instances, demonstrations, visualization and practical examples are critical to effective learning. Speaking more exactly, the use of AI-generated visualizations, movement drawings, and training videos can be viewed as one of the factors that contribute to psychomotor learning since it provides more impressive examples of movement patterns, sports techniques, and the performance of motor skills. Unlike the more academic disciplines, physical education entails students observing, imitating, refining, and realizing physical actions. Therefore, AI-assisted visual materials can serve to fill the gap between verbal description and physical action, thus contributing to the formation of psychomotor skills. Recent studies have indicated that psychomotor learning can be encouraged through intelligent learning systems that enhance visualization, feedback and support for skills development (Casas-Ortiz et al., 2026). In line with this, Kadhim et al. (2025) found that AI-aided interventions helped to build up the fundamental motor and movement abilities of students in the course of physical education teaching. Although no direct measure of the outcomes of student performance was realized in the current research, the results show that the teachers believe that GenAI is a useful tool to help in the processes of movement-based instruction and psychomotor learning. Through this, the use of AI-generated images, videos, summaries, and mind maps by teachers proves that

the multimodality of physical education is being taken care of by modifying AI technologies. This finding aligns with the recent discussions regarding the possibilities of AI to streamline the educational process in sports by offering personalized education, intelligent feedback, and novel educational opportunities (Konukman et al., 2025; Wang & Wang, 2024).

The organization of learning materials with the help of NotebookLM is among other novelties of this study. Even though previous studies have mostly focused on conversational AI applications such as ChatGPT, the adoption of NotebookLM implies a shift towards document-based AI assistance. Rather than generating new information, teachers have begun to summarize, organize, and interact with the already existing learning materials using AI. This is more so for teachers who will need to deal with curriculum documents, teaching modules and professional materials. Therefore, the discovery makes a contribution to existing AI education resources by stating the shift towards AI as a knowledge management helper instead of a content-generating tool.

The dominance of ChatGPT, Gemini, and Meta AI can also be used as a great lesson on how to think about which factors play a role in the use of technology among physical education teachers. Although there are various AI platforms, there appeared to be a preference among teachers to use applications that are convenient, familiar, and belong to their existing digital landscape. The extensive application of Meta AI via WhatsApp should be given special consideration as WhatsApp is a commonly used communication tool among teachers in Indonesia. This finding shows the importance of effort expectancy and facilitating conditions in the UTAUT model, and there is a possibility that the facilitating nature of ease of access and compatibility with the existing habits may have a more influential impact on the adoption, not necessarily because of the technological sophistication per se.

The other valuable finding is associated with the use of GenAI in the post-teaching assignments, in this instance, with intracurricular and extracurricular reporting. Inasmuch as AI in education is commonly referred to as classroom training, in this research, teachers utilized AI to complete administrative work as well. This finding aligns with the earlier research that suggests that the application of AI technologies will assist in eradicating monotonous professional activities and allow teachers to focus more on value-added educational activities (Deshen et al., 2026). Competitions and extra-curricular activities, which are usually led by teachers in the context of physical education, may be a potentially promising (but under-researched) area of technology integration.

In spite of these favorable results, there are a number of issues which still affect the implementation of GenAI among physical education educators. The concerns about information accuracy show that teachers realize the inadequacy of AI-generated content and the need for human verification. The finding supports previous studies that have pointed to the issues of misinformation, reliability, and responsible AI usage in education (Ghimire et al., 2024; Monib et al., 2024). Therefore, AI implementation must not be limited to the presence of technology but also must be developed as AI literacy, including the potential of teachers to interpret, modify, and use artificial intelligence-generated information ethically.

Additionally, limited access to the internet and professional training continue to be a challenge, especially to teachers in non-urban areas. However, the level of individual motivation to use GenAI among the teachers was very high; the social influence score indicates that social support provided by the institution is not as developed as personal adoption. This implies that a significant number of teachers could be present independent AI adopters instead of agents of institutional change that occurs in a systematic manner. Schools, communities of teachers, and policymakers ought to thus offer organized professional development initiatives that do not necessarily emphasize technical AI abilities but pedagogical and ethical incorporation of AI.

Figure 2 is a summary of the instructional integration pathway that was found during this study. The framework demonstrates the ways GenAI aids physical education teachers in three related levels of teaching: pre-teaching, whilst-teaching, and post-teaching. During the pre-teaching stage, AI is primarily applied in lesson planning, the development of teaching materials and preparing tests. During the whilst-teaching stage, AI is used to help with visual learning

content, multimedia content and the structure of instructions, such as the use of NotebookLM. Finally, at the post-teaching stage, AI will help with reporting, documentation, and administration of extracurricular programs. This model builds on the past debates about AI-assisted teaching by showing that GenAI can be used as an ongoing teaching assistant and not a resource that is limited to a specific classroom setting (Konukman et al., 2025; Wang & Wang, 2024). The framework also focuses on how AI can be integrated to enhance the efficiency of instruction and support cognitive, affective, and psychomotor learning in physical education.

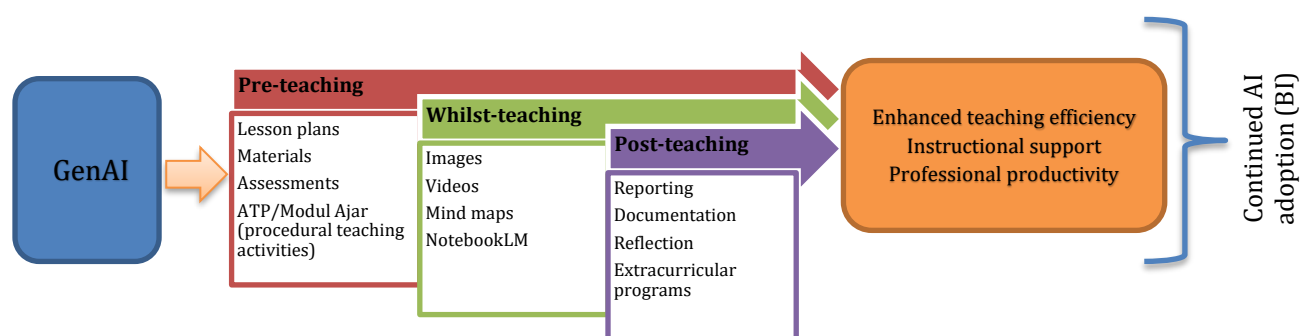


Figure 2. Conceptual Framework of GenAI Integration Across Physical Education Teaching Stages

In the context of Indonesian education, the results also echo the general agenda of educational digitalization and incorporation of technology in the country. The establishment of digital skills, the responsible utilization of technology and innovation-driven learning settings are emphasized by the priority of education and the roadmap of the Indonesian national artificial intelligence (Badan Pengkajian dan Penerapan Teknologi, 2020). To this effect, the fact that GenAI was positively embraced by teachers in physical education implies that teachers are increasingly ready to embrace the new digital technologies in their teaching practice. However, the obstacles that have been revealed in this paper, especially the residential ones that pertain to infrastructure, AI literacy, and professional growth, show that the policy ambitions should be supported with long-term capacity-building initiatives and equal access to technology. Without such measures, the access and preparedness disparities may limit the effectiveness of digital transformation efforts, particularly outside of big cities.

As to the areas where the integration is to be implemented, another interesting fact worth mentioning is presented in Table 4. One of the notable demographics of this study is a large percentage of male respondents since they represented 95.5% of the sample population. This distribution is perhaps a pointer to the gender split present in much of teaching physical education in Indonesia, in which there are still proportionately more male teachers than women teachers in teaching sports and movement. As a result, the results are mostly the experiences and views of male physical education teachers with respect to GenAI adoption. Although the current research did not examine gender variation in technology acceptance, past studies have indicated that gender could be a factor that affects the behavior of educators towards the use of technologies, their confidence and adoption trends. In this way, it is hoped that in the future, the research will be more equally represented in gender to establish whether there could be a difference between how male and female physical education teachers adopt AI. The existing results are also to be interpreted with relevant consideration of the demographic features of the sample.

Implications of the Study

This study has a number of implications. Theoretically, this research is an extension of the application of UTAUT in that it demonstrates that the perceived usefulness and ease of use are not the only factors that determine the implementation of GenAI among physical education

instructors but also the realities of teaching. The identification of pre-teaching, whilst-teaching and post-teaching AI use offers a contextual realization of the incorporation of AI in the professional practice of teachers. In practice, these findings suggest that AI training for physical education teachers cannot be based on the implementation of AI tools but has to be transformed to the themes of curriculum design, movement-based learning support, creation of assessment tools, and responsible AI assessment.

Nonetheless, there are certain limitations of this study. First, the sample was restricted to physical education teachers in selected areas of Aceh Province; not to mention the small number of female teachers taking part in the study, thus the results might not be suitable in reflecting the teachers in other geographical and learning environments. Second, the study was carried out on self-reported data, which might be affected by the perception of the teachers, rather than the real observations of the application of AI in classroom practices. Third, the descriptive research design describes the trends of adoption but fails to identify causal relationships between UTAUT constructs. To examine the efficacy of AI-facilitated physical education practices, future research should include larger sample sizes, comparative regional studies, classroom observations, or experimental studies.

Overall, this study has indicated that the GenAI application within physical education teachers is becoming a potential response to the teaching and management requirements. AI is a technological device used by teachers for immediate solutions in the preparation of lessons, enhancement of learning, and even in the line of duty. However, to implement AI sustainably, more institutional backing, higher levels of AI literacy, and professional development should be sustained to make sure that the integration of AI supports and does not substitute the pedagogical knowledge of teachers.

CONCLUSION

This study discussed how physical education teachers employ GenAI in their teaching approaches in the context of the UTAUT model. The findings suggest that physical education teachers tended to be optimistic about the acceptance of GenAI, particularly with regard to utility and the intention to continue using AI in professional practice. Instead of being just a technological fad, GenAI has evolved into a viable support mechanism, helpful to educators at various teaching levels, such as pre-teaching preparation, whilst-teaching activities, and post-teaching administration.

The main contribution of the research is to show how the teachers of physical education include GenAI in their real teaching process. Lesson planning, instructional resource development, assessment development, and visual aid support, organization of teaching materials, and administration were the most frequent applications of AI by teachers. The fact that the available tools, such as ChatGPT, Gemini and Meta AI, are highly popular demonstrates that usability and familiarity are crucial elements that can be utilized to convince educators to welcome AI. Moreover, the rise in the application of tools like NotebookLM indicates a new trend of departure from AI as a content-generation tool and adoption of AI as an instructional organization helper.

Although these opportunities exist, there are still challenges, such as the accuracy of information, access to the internet and lack of professional training, which impede successful implementation. Therefore, physical education should not just have GenAI integration available (in physical education) but also, professional development towards AI literacy, ethical use, and adaptation to pedagogy, in order to be sustainable. Future research needs to involve larger groups of people, gender balance and involve other educational backgrounds besides the studies carried out within the classroom setup to be able to comprehend the impact of AI-supported practices on the physical education learning outcomes.

BIBLIOGRAPHY

- Badan Pengkajian dan Penerapan Teknologi. (2020). *Strategi nasional kecerdasan artifisial Indonesia 2020-2045*. <https://korika.id/wp-content/uploads/2024/07/stranas-ka-2045.pdf>
- Baidoo-anu, D., & Ansah, L. O. (2023). Education in the era of generative artificial intelligence (AI): Understanding the potential benefits of ChatGPT in promoting teaching and learning. *Journal of AI*, 7(1), 52–62. <https://doi.org/10.61969/jai.1337500>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp0630a>
- Braun, V., & Clarke, V. (2022). *Thematic analysis: A practical guide*. SAGE.
- Casas-Ortiz, A., Jimenez-Tellez, N., Portaz, M., & Santos, O. C. (2026). A holistic framework to create intelligent systems for psychomotor learning: A systematic review and insights from the virtual reality Kenpo learning simulator. *Virtual Reality*, 30(2), 72-. <https://doi.org/10.1007/S10055-026-01326-1>
- Deshen, M., Harari, R., & Aharony, N. (2026). Teachers' adoption of generative artificial intelligence (GenAI) in educational settings. *Cogent Education*, 13(1), 1–20. <https://doi.org/10.1080/2331186x.2026.2624877>
- Gamlem, S. M., McGrane, J., Brandmo, C., Moltudal, S., Sun, S. Z., & Hopfenbeck, T. N. (2026). Exploring pre-service teachers' attitudes and experiences with generative AI: A mixed methods study in Norwegian teacher education. *Educational Psychology*, 27–51. <https://doi.org/10.1080/01443410.2025.2528663>
- Ghimire, A., Pather, J., & Edwards, J. (2024). Generative AI in education: A study of educators' awareness, sentiments, and influencing factors. *2044 IEEE Frontiers in Education Conference (FIE)*, 1–9. <https://doi.org/10.1109/fie61694.2024.10892891>
- Ibrahim, K., Osuizugbo, I. C., Dandajeh, M. A., Omer, M. M., Oshodi, O. S., & Ezeudu, B. O. (2026). Barriers and enablers for adopting artificial intelligence for learning and teaching: Evidence from Nigeria. *Journal of Structural Design and Construction Practice*, 31(3), 04026029. <https://doi.org/10.1061/jsdccc.sceng-1969>
- Ilma, A., & Rohmah, Z. (2025). AI in EFL education: Teachers' competence and the roadblocks to teaching material development. *Cogent Education*, 12(1), 1–18. <https://doi.org/10.1080/2331186x.2025.2588471>
- Istiarsyah, I., Maisura, M., Nurhabibah, N., Kumita, K., & Kamarullah, K. (2025). Transforming teacher competence through ChatGPT: Designing innovative and effective lesson modules. *Ideguru: Jurnal Karya Ilmiah Guru*, 10(1), 505–513. <https://doi.org/10.51169/ideguru.v10i1.1586>
- Jin, Y., Yan, L., Echeverria, V., Gašević, D., & Martinez-Maldonado, R. (2025). Generative AI in higher education: A global perspective of institutional adoption policies and guidelines. *Computers and Education: Artificial Intelligence*, 8, 100348. <https://doi.org/10.1016/j.caeai.2024.100348>

- Kadhim, M. A. A., Abdulrasool, T. H., Almayah, S. J. K., Aldewan, L. H., & Ghazi, M. A. (2025). The impact of artificial intelligence techniques in developing basic and motor skills for students through the physical education lesson. *Retos*, 73, 1039–1048. <https://doi.org/10.47197/retos.v73.117711>
- Kamarullah, K., Fadhilah, M. A., Syahmidi, H., Maulya, R., & Sarinauli, B. (2024). Tech-transformed teaching: The influence of AI writing tools and blended learning on rural education. *ELLITE: Journal of English Language, Literature, and Teaching*, 9(2), 34–48. <https://doi.org/10.32528/ellite.v9i1.2504>
- Kamarullah, K., Sarinauli, B., & Syahmidi, H. (2024). AI writing tools in the classroom: Investigating usage, challenges, and adaptations by rural English teachers. *Premise: Journal of English Education and Applied Linguistics*, 13(3), 1015–1042. <https://doi.org/10.24127/pj.v13i3.10914>
- Konukman, F., Sortwell, A., Filiz, B., Tüfekçioglu, E., Yılmaz, E. B., & Ünlü, H. (2025). Using artificial intelligence in teaching health and physical education. *Journal of Physical Education, Recreation & Dance*, 96(7), 58–62. <https://doi.org/10.1080/07303084.2025.2522601>
- Monib, W. K., Qazi, A., Apong, R. A., Azizan, M. T., Silva, L. De, & Yassin, H. (2024). Generative AI and future education: A review, theoretical validation, and authors' perspective on challenges and solutions. *PeerJ Computer Science*, 10, e2105. <https://doi.org/10.7717/peerj-cs.2105>
- Prilop, C. N., Mah, D. K., Jacobsen, L. J., Hansen, R. R., Weber, K. E., & Hoya, F. (2025). Generative AI in teacher education: Educators' perceptions of transformative potentials and the triadic nature of AI literacy explored through AI-enhanced methods. *Computers and Education: Artificial Intelligence*, 9, 100471. <https://doi.org/10.1016/j.caeai.2025.100471>
- Rasool, U., Li, J., & Liu, M. (2025). Perceptions of generative AI in teaching and learning: UTAUT and TPACK model-based study of teachers and students. *Acta Psychologica*, 261, 105827. <https://doi.org/10.1016/j.actpsy.2025.105827>
- Saputra, Y. M., Ali, E. Y., Yulianto, A. G., & Aman, M. S. (2026). Rasch model analysis of artificial intelligence technology implementation among multidisciplinary FIKK students in higher education. *Tadulako Journal Sport Sciences And Physical Education*, 14(2), 14–24. <https://doi.org/10.22487/tjsspe.v14i2.6185>
- Song, X. (2024). Physical education teaching mode assisted by artificial intelligence assistant under the guidance of high-order complex network. *Scientific Reports*, 14(1), 4104-. <https://doi.org/10.1038/s41598-024-53964-7>
- Sukmawana, T., Nuryadi, N., & Sucipto, S. (2026). Application of augmented reality (AR) to improve educational motivation and psychomotor skills of participants in physical education. *Tadulako Journal Sport Sciences And Physical Education*, 14(2), 34–42. <https://doi.org/10.22487/tjsspe.v14i2.6192>
- Taber, K. S. (2017). The use of Cronbach's Alpha when developing and reporting research instruments in science education. *Research in Science Education*, 48(6), 1273–1296. <https://doi.org/10.1007/s11165-016-9602-2>
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly: Management Information Systems*, 27(3), 425–478. <https://doi.org/10.2307/30036540>

- Venkatesh, V., Thong, J. Y. L., & Xu, X. (2016). Unified theory of acceptance and use of technology: A synthesis and the road ahead. *Journal of the Association for Information Systems*, 17(5), 328–376. <https://doi.org/10.17705/1jais.00428>
- Wang, Y., & Wang, X. (2024). Artificial intelligence in physical education: Comprehensive review and future teacher training strategies. *Frontiers in Public Health*, 12, 1484848. <https://doi.org/10.3389/fpubh.2024.1484848>