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Integration of Artificial Intelligence on Teaching the Course of Didactic Methodology: A Case Study

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Abstract

The potential of artificial intelligence is exploding in various aspects of daily and working life, improving the standard of living for people worldwide. In this light, it is clear that the field of education cannot remain unaffected. New research is bringing to light the advantages and challenges of integrating artificial intelligence into education with increasing frequency. With technological advancements and new opportunities emerging, the potential applications of artificial intelligence continue to expand. In order to maximize learning outcomes and promote holistic development in students, teachers must leverage AI effectively. The purpose of this paper is to examine the use of artificial intelligence in teaching the course of Didactic Methodology as part of the pedagogical education of Secondary school teachers. Using insights from relevant studies, the study examines whether Artificial Intelligence enhances the educational process. Artificial Intelligence for educational purposes will be reviewed in terms of its advantages and challenges. In the following case study, an entire didactic lesson will be described and learning materials will be provided. As part of this project, Artificial Intelligence (AI) was asked to create learning materials for a whole lesson within the course. Based on the course needs, learning materials were collected and structured. After generating the learning material, it was analysed and studied accordingly. The evaluation of the learning material will be done in relation to the course objective and the degree to which this has been achieved will be

judged by the students' learning outcomes. As demonstrated in this study, Artificial Intelligence is able to provide satisfactory answers, and it can be used to customize teaching materials to meet the needs of teachers. This paper is intended to meet teachers' needs as well as those of contemporary digital societies in the 21st century.

Keywords: Artificial Intelligence, education, new technologies, learning material

Introduction

In the realm of education, emerging technologies have also been empirically demonstrated to lead to favourable outcomes. In a way that goes beyond mere didactics, new technologies profoundly change the educational system. Over the past decade, Artificial Intelligence in Education (AIED) has grown rapidly (Crompton, Jones & Burke, 2022; Popenici & Kerr, 2017). This is due to the fact that it is an emerging field of education technology (Zawacki, Richter et al., 2019).

Artificial intelligence in education presents many research challenges across many disciplinary areas. Developing AI-driven learning models and frameworks is part of this approach. Researchers also want to assess student performance and learning experiences. As AI plays a variety of educational roles, there is a need to reevaluate and re-define educational theories. In addition to AI-backed educational materials, innovation in learning strategies and evaluation approaches will be the key. Another area of exploration is integrating big data analytics into education. Researchers are also working on large-scale learning platforms utilizing AI. A crucial focus is placed on ethical AI deployment, emphasizing ethical principles (Hwang, Xie et al., 2020).

The latest developments in artificial intelligence offer education a host of potential applications. It can act as an intelligent tutor, tutee, learning partner, or policy advisor, all of which are facilitated by the latest advances in artificial intelligence. Through AIED, students can receive a personalized tutor in a contemporary context, while collaborative learning can be enhanced through features like adaptive group formation, expert facilitation, intelligent virtual agents, and intelligent moderation. Additionally, virtual reality experiences with intelligent content can be used to enhance learning in authentic environments. A study conducted recently found that artificial intelligence can be enhanced in higher education, resulting in personalised learning, intelligent tutoring, facilitation of collaboration, and automated grading (Crompton & Song, 2021). The advantages and potentials of artificial intelligence, however, are similar to those of any other technology, but there are also a number of challenges to overcome in education. With chatbots, gamification elements, interactive challenges, and personalized feedback can be used to create an engaging and enjoyable learning experience. It is rewarding for learners to interact successfully with chatbots when they receive immediate feedback and feel accomplished. A previous study found that students perceived chatbots to be useful and easy to use in

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online activities that supported goal setting and social interactions (Hew, Huang, Du & Jia, 2023). In a study examining the impact of social presence on learner motivation, a chatbot was used as a medium. Also, the majority of learners reported being satisfied with their first blended learning experience. Students' engagement and interest in reading were positively impacted by the chatbot implemented in another study (Liu, Liao, Chang & Lin, 2022), and social connections contributed to their engagement. Learners will gain confidence, improve specific learning points, receive direct feedback, and accomplish more than they could if they only had human teachers or peers to help them learn by using this chatbot (Wahyuni, 2022). This chatbot will provide learners with adequate time and location to learn, and will enable them to build their confidence, improve specific learning points, and receive direct feedback (Wahyuni, 2022). As a result of a negative perception or misuse, artificial intelligence can negatively affect education (Crompton, Jones & Burke, 2022). It is due to this lack of understanding and inefficiency that teachers are unable to teach technology skills. Therefore, they must view it positively. There are hardware and software challenges related to developing specific AI programs. Ethics privacy is about the privacy of a person's data. For educators to integrate AIED into their classrooms, AIED needs more research to implement it in education, purchase technology, and develop specific AI programs. Best practices and frameworks for integrating artificial intelligence will help teachers in the future (Crompton, Jones & Burke, 2023).

AIED research remains interested, but little is being done to integrate deep learning. Traditional artificial intelligence tools were used in education, but advanced techniques were rarely applied. Robots and artificial intelligence can help teachers, learners, and decision makers. Using digital technologies (Hrastinski, Olofsson, Arkenback, et al., 2019), teachers and students were better able to understand how they worked. GPT-3.5 relies on extensive language datasets for optimal operation, so teacher guidance can be vague. Artificial intelligence is evaluated in relation to student-teacher "didactic methodology" courses in terms of authenticity, attribution, and authorship.

Teaching with artificial intelligence and chatbots: teachers' perceptions

The effectiveness of chatbots is also an issue for educators (Quiroga Pérez, Daradoumis & Marquès Puig, 2020). In a study (Pokrivcakova, 2022), many future teachers were unaware that chatbots provided interactive exercises and improved learning effects. In the absence of digital education, most respondents rated their interactions positively based on their previous or first experiences with chatbots. The survey respondents rated the conversations as enjoyable, appropriate in formality, linguistically accurate, easy to maintain, fluent, and entertaining. Although nearly half of respondents said they would not use chatbots in the future, educators and students both expressed an enthusiasm for ChatGPT.

Autonomous learning and chatbots

A growing number of educators are using chatbots to foster autonomous learning. A chatbot allows learners to interact with each other 24/7, receive instant feedback, and customize their learning experience. As learners actively seek out learning opportunities, chatbots encourage curiosity and intrinsic motivation. AI holds great promise in education, but ethical concerns, student privacy, and responsible management with human educators must be addressed. Participants were enthusiastic, happy, and motivated during this training due to the fact that this application was still new to them. In addition, this application provides participants with indirect learning opportunities, regardless of their location (Oktadela, Elida & Ismail, 2023). Instead of using chatbots exclusively for language acquisition, learners may find it more effective to use them as a supplement. Students found that the chatbot's responses were unanthropomorphic, which was a limitation (Liu, Liao, Chang & Lin, 2022).

Why using artificial intelligence, for teaching the course of didactic methodology? There are many reasons: To monitor performance, to create learning material easier, to create personalized learning materials adapted to each audience, to add additional material, exercises, to create activities easily, to save time and to help teachers who have never taught the course before.

As part of pedagogical education for secondary education teachers, this paper examines the use of artificial intelligence in teaching Didactic Methodology. In this study, insights from relevant studies are used to determine whether Artificial Intelligence enhances education. It will be discussed in terms of its advantages and challenges to use Artificial Intelligence as a teaching tool. This case study provides an overview of a didactic lesson and learning materials for the entire lesson within the course. In order to complete this project, Artificial Intelligence (AI) was asked to create learning materials for a whole lesson within the course. As a result of collecting and structuring learning materials, they were analyzed and studied after they had been generated. Using the course objective as a guide, the learning material will be evaluated, and students' learning outcomes will be used to determine the extent to which the objective has been achieved. Using Artificial Intelligence to customize teaching materials has been demonstrated in this study, as well as providing satisfactory answers.

The present study focuses on the Annual Pedagogical Training Program (EPPAIK) program at Higher School of Pedagogical and Technological Education (ASPAITE) and is addressed to those who have graduated from university schools. In a modern learning environment, the program offers experiences that allow the development of teaching competence within the framework of the curriculum through experiential learning. Teachers and teacher candidates are invited to attend and participate in the Pedagogical Training Program regardless of their specialization. This course is designed to foster a comprehensive comprehension of the intricate and diverse

nature of the teaching phenomenon. Participants will develop a heightened awareness of its crucial significance in education. The overarching goal is to establish a robust theoretical foundation and cultivate the skills necessary for effective planning, organization, implementation, and evaluation of the teaching and learning process, including the planning, organization, and evaluation of teaching practices.

Methodology

Anthropic Claude AI and ChatGPT, two of OpenAI's platforms used to interact with leading large language models, were used in conjunction with other chatbots. Open AI - ChatGPT 3,5 and Google Bard can be used to generate human-like conversations without requiring any coding. The two platforms successfully switched between topics and conversed. This case study intricately examines the seamless transition between topics and the adept conversational engagement facilitated by OpenAI platforms. It delves into the mechanisms and methodologies employed by these platforms to navigate diverse subject matters, offering a detailed exploration of their capabilities in maintaining coherent and contextually relevant conversations across a spectrum of topics. It also explored the effectiveness of these chatbots in providing a human-like experience. Finally, the study examined the potential of these chatbots to be used for the course of "Didactic methodology". Defining the context of this case study is the first step. The primary audience for this course comprises individuals aspiring to become educators in Secondary Education Schools. The topic of the discussion was "Integration of Technology in Teaching".

The first Prompt gave the definition of the context - framework of the course "Didactic Methodology" (Principles and course philosophy, learning objectives, Course outline, Teaching and learning methods).

ChatGPT's response concerned the course philosophy and methodology that prioritize the development of a holistic understanding of teaching, fostering critical thinking, and promoting innovative and effective teaching practices.

The second Prompt was: "Based on the following outline of the course "Didactic Methodology», prepare a 13-week laboratory course, each week separately, 2 hours per week, for trainees who, after obtaining a university degree, are interested in becoming Secondary school teachers:"

ChatGPT's response was: "Certainly, let's break down the 13-week laboratory course for prospective secondary school teachers, aligning each week with the specific topics outlined in the "Didactic Methodology" course. Each session will last for 2 hours, ensuring comprehensive coverage of the essential aspects of teaching and learning". Then, it gave the topic and the titles of sessions for each week as it is described below:

Week 1: Introduction to the Phenomenon of Teaching and Learning (2 hours)

Session 1: Overview of the course objectives and expectations.

Session 2: Understanding the historical and conceptual foundations of teaching and learning.

Week 2: Principles of Teaching and Learning (2 hours)

Session 3: Exploring the fundamental principles and conditions for effective teaching and learning.

Session 4: Discussing the importance of goal-setting and educational objectives in the teaching process.

Week 3: Understanding Teaching Models (2 hours)

Session 5: Analyzing various teaching models and their applications in a secondary school setting.

Session 6: Examining the relationship between teaching planning, curriculum development, and effective instruction.

Week 4: Effective Teaching Techniques (2 hours)

Session 7: Understanding the importance of effective communication in the classroom, both verbal and non-verbal.

Session 8: Integrating innovative teaching methods and the role of technology in enhancing learning experiences.

Week 5: Classroom Dynamics and Interactive Teaching (2 hours)

Session 9: Establishing a positive classroom atmosphere and managing classroom dynamics effectively.

Session 10: Implementing interactive teaching strategies, such as group work and cooperative learning, to foster student engagement.

Week 6: Evaluation of Teaching and Learning (2 hours)

Session 11: Exploring various techniques for evaluating student progress and understanding the learning process.

Session 12: Assessing the impact of prior student perceptions and experiences on the teaching and learning process.

Week 7: Innovative Teaching Approaches (2 hours)

Session 13: Investigating cutting-edge teaching methodologies and their practical applications within the contemporary educational milieu.

Week 8: Developing Personal Teaching Identity (2 hours)

Session 14: Reflecting on personal teaching styles and philosophies.

Session 15: Understanding the role of the teacher in creating a dynamic and effective learning environment.

Week 9: Integration of Technology in Teaching (2 hours)

Session 16: Exploring the potential of various educational technologies in enhancing teaching effectiveness.

Session 17: Practical applications of technology in lesson planning and instructional delivery.

Week 10: Promoting Critical Thinking and Creativity (2 hours)

Session 18: Encouraging critical thinking and creativity in the classroom.

Session 19: Fostering a culture of open-ended inquiry and intellectual exploration.

Week 11: Effective Classroom Management (2 hours)

Session 20: Strategies for maintaining discipline and managing diverse classroom environments.

Session 21: Creating a conducive learning atmosphere that supports student development and engagement.

Week 12: Differentiated Instruction and Inclusive Teaching (2 hours)

Session 22: Understanding the importance of differentiated instruction to meet diverse learning needs.

Session 23: Promoting inclusive teaching practices and accommodating students with varied abilities and backgrounds.

Week 13: Professional Growth and Ethical Responsibilities (2 hours)

Session 24: Cultivating continuous professional development and lifelong learning in the field of education.

Session 25: Addressing ethical considerations and responsibilities in the teaching profession.

The third Prompt was: "Integration of Technology in Teaching". ChatGPT provided detailed instructions about the topic and the sessions as it follows:

Week 9: Integration of Technology in Teaching (2 hours)

Session 16: Exploring the Potential of Various Educational Technologies (2 hours)

Introduction to the diverse range of educational technologies available for enhancing teaching effectiveness.

Examination of interactive learning platforms, educational apps, and digital resources.

Case studies highlighting successful integration of technology in different subject areas and teaching contexts.

Discussion on the benefits and challenges associated with the use of educational technologies in the classroom.

Critical evaluation of the role of technology in promoting student engagement, collaboration, and personalized learning experiences.

Consideration of emerging trends in educational technology and their potential impact on future teaching practices.

Group activities or presentations where participants explore and present specific educational technologies that can be integrated into their teaching practices.

Session 17: Practical Applications of Technology in Lesson Planning and Instructional Delivery (2 hours)

Overview of effective strategies for integrating technology into lesson planning and instructional design.

Demonstration of how to incorporate multimedia elements, such as videos, interactive presentations, and digital simulations, to enhance lesson content and engagement.

Hands-on practice with educational software and tools for creating interactive activities and assessments.

Collaborative workshop on designing technology-enhanced lesson plans that cater diverse learning styles and abilities.

Guidance on how to leverage technology to differentiate instruction and personalize learning experiences for students.

Discussion on the importance of aligning technology integration with learning objectives and curriculum standards.

Reflection on the potential challenges and troubleshooting techniques related to the use of technology in classroom.

Group discussions or case studies exploring real-life examples of successful technology integration in various subject areas and grade levels.

The fourth Prompt concerns the theory for week 9 focusing on the integration of technology in teaching: "compose the theory to teach for week 9". ChatGPT provided an overview, the key Concepts and a conclusion.

The fifth Prompt analyze the key concepts outlined in the theory of integrating technology in teaching: "analyze key concepts". ChatGPT provided the key concepts outlined in the theory of integrating technology in teaching (Pedagogical Benefits of

Educational Technology, Effective Integration Strategies, Digital Literacy and Equity, Future Trends in Educational Technology)

The sixth Prompt concerns the creation of an activity: "Activity for Integration of Technology in Teaching ". ChatGPT provided activity description and learning outcomes as it follows:

Activity Title: "Interactive Lesson Design Challenge"

Activity Description:

1. Divide participants into small groups of 3-4 individuals.

2. Provide each group with a specific topic or subject relevant to the secondary school curriculum.

3. Guide each group to design an interactive lesson plan utilizing educational technology tools and resources.

4. Encourage participants to consider diverse learning styles and the integration of multimedia elements.

5. Allocate time for groups to explore various educational technology options and platforms.

6. Guide participants on incorporating interactive activities, assessments, and multimedia content into their lesson plans.

7. Emphasize the importance of aligning technology integration with learning objectives and curriculum standards.

8. Encourage groups to present their completed lesson plans to the rest of the class.

9. Facilitate a peer review session where other groups provide feedback and suggestions for improvement.

10. Conclude the activity with a group discussion on the benefits, challenges, and best practices for integrating technology effectively into teaching practices.

Learning Outcomes:

- Enhanced understanding of the practical applications of educational technology in lesson planning.

- Improved proficiency in utilizing various technology tools and resources to create engaging and interactive learning experiences.

- Increased awareness of the importance of aligning technology integration with learning objectives and curriculum standards.

• Strengthened collaborative and problem-solving skills through group-based lesson design challenges.

The seventh Prompt involves a fill in the blanks exercise (task). "Compose an exercise "fill in the blanks" for week 9 and give the correct answers". ChatGPT provided the title of the exercise and five items with the correct answers.

Exercise: Fill in the Blanks

1. The integration of technology in teaching can significantly enhance _____ and foster student engagement.

2. Effective alignment of technology use with specific learning objectives ensures that technology serves as a tool to enhance _____.

3. Digital literacy is essential for ensuring effective participation in the _____.

4. The concept of the _____ emphasizes the importance of providing equal access to technology for all students.

5. Emerging trends in educational technology, such as augmented reality and adaptive learning platforms, have the potential to transform _____.

The eighth Prompt involves a multiple-choice exercise. "Compose a multiple-choice exercise with 10 items for week 9 and give the correct answers". ChatGPT gave instructions for the multiple-choice exercise, followed by the correct answers.

Exercise: Multiple Choice

1. What is one of the key benefits of integrating technology in teaching?

a) Increased paperwork for teachers

b) Reduced student engagement

c) Enhanced learning experiences

d) Limited access to educational resources

2. What should educators consider when integrating technology into lesson planning?

a) Ignoring learning objectives

b) Aligning technology use with learning objectives

c) Relying solely on traditional teaching methods

d) Disregarding student diversity

3. Why is digital literacy important in the modern era?

a) To discourage student participation

b) To limit access to information

c) To promote effective participation in the digital age

d) To discourage technological advancements

4. What does the concept of the "digital divide" refer to?

a) Equal access to technology for all students

b) Limited technological advancements

c) Unequal access to technology among students

d) Embracing digital inclusivity

5. Which of the following is an example of an emerging trend in educational technology?

a) Traditional textbooks

b) Chalkboards

c) Augmented reality

d) Rotary phones

6. How can technology support differentiated instruction in the classroom?

a) By limiting student engagement

b) By promoting standardized learning experiences

c) By tailoring learning experiences to individual student needs

d) By discouraging collaboration

7. What is one potential challenge associated with technology integration in education?

a) Improved student engagement

b) Enhanced learning outcomes

c) The digital divide

d) Bridging the generation gap

8. What role does educational technology play in creating dynamic learning environments?

a) Hindering student creativity

b) Limiting student engagement

c) Fostering collaboration and critical thinking

d) Discouraging student participation

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9. How can educators stay updated with the latest trends in educational technology?

a) Ignoring technological advancements

b) Attending professional development workshops

c) Avoiding digital resources

d) Disregarding student interests

10. How does technology contribute to student engagement in the classroom?

a) By discouraging active participation

b) By limiting learning opportunities

c) By fostering interactive and immersive experiences

d) By hindering critical thinking

The ninth Prompt concerns the creation of an exercise with open-ended questions. More specifically, the Prompt was: "Compose 10 open-ended questions for week 9 and give the answers. ChatGPT provided 10 open-ended questions as they follow:

1. How can educational technology enhance the learning experiences of students in the classroom?

2. What are some effective strategies for aligning technology use with specific learning objectives and curriculum standards?

3. Why is it essential to promote digital literacy among students, and how does it contribute to their overall educational development?

4. In what ways can educators address the issue of the digital divide in educational settings, and why is it important to ensure equitable access to technology for all students?

5. How do emerging trends in educational technology, such as virtual reality and adaptive learning platforms, impact the future of teaching and learning?

6. What are some effective ways educators can leverage technology to support differentiated instruction and meet the diverse learning needs of students?

7. What are some of the potential challenges educators might encounter when integrating technology into their teaching practices, and how can they overcome these challenges?

8. How does educational technology contribute to the development of critical thinking and collaboration skills among students, and what are some effective examples of its implementation in the classroom?

9. How can educators ensure that the integration of technology in teaching remains purposeful and meaningful, rather than just a trend or a novelty?

10. What role does educational technology play in fostering a student-centered learning environment, and how can educators create a balance between technology use and traditional teaching methods?

For each question ChatGPT gave one sample answer.

The tenth Prompt is about creating a "match-the-pair" exercise. The Prompt given is as it is described below: "Compose a match-the-pair exercise for week 9 with 10 items". ChatGPT has created the exercise followed by the instructions the correct answers:

Match the items in Column A with the corresponding items in Column B.

Educational Technology (a) Bridging the digital divide

Digital Literacy (b) Personalized instruction

Technology Integration (c) Interactive learning experiences

Augmented Reality (d) Future trends in education

Adaptive Learning (e) Equitable access to technology

Student-Centered Learning (f) Fostering critical thinking

Digital Divide (g) Understanding digital resources

Personalized Instruction (h) Integrating technology effectively

Critical Thinking (i) Immersive learning environments

Future of Education (j) Tailoring learning experiences

The eleventh Prompt concerns the Bibliography of the topic. The Prompt given was: "provide bibliography for Integration of Technology in Teaching". ChatGPT provided the following existing references:

1. Roblyer, M., & Doering, A. H. (2007). Integrating educational technology into teaching. USA: Pearson, 2007.

2. Koehler, M. J., Mishra, P., & Cain, W. (2013). What is technological pedagogical content knowledge (TPACK)?. Journal of education, 193(3), 13-19.

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Results

This short study examined (1) how a teacher of the course "didactic methodology" communicates or collaborates with an AI Chatbot and (2) how well an AI chatbot responds to the intended goals of the experienced foreign language teacher. As a result of reviewing the ChatGPT and Bard responses and considering courses' framework, the target audience, and the produced teaching material, the following conclusions have been drawn: ChatGPT:

gave the definition of the context - framework of the course "Didactic Methodology".

• prepared a 13-week laboratory course, each week separately, 2 hours per week.

• provided detailed instructions about the topic and the sessions.

• composed the theory to teach for week 9".

• provided the key concepts outlined in the theory of integrating technology in teaching. provided activity description and learning outcomes.

• created a "fill in the blanks exercice for week 9 and provided the correct answers.

• Created a multiple-choice exercise with 10 items for week 9 and provided the correct answers.

• provided 10 open-ended questions followed by the instructions the correct answers.

• provided existing references.

Except for some individual points that the teacher had to identify, such as the bibliographical references, the answers given and the material as a whole were quite satisfactory.

It is important to emphasize, however, the importance of the teacher's prior experience in order to be able to check and correct or give dedicated prompts in a different manner, in order to produce the desired result.

Conclusions

The Open AI tools ChatGPT or Google Bard can be used to create personal teaching materials based on the parameters you specify. Based on the results of the study, Open AI - ChatGPT and Google Bard were useful for answering questions from the teacher

of the course 'Didactic Methodology' about creating learning objects. Additionally, it has been possible to significantly reduce the amount of time it takes to develop and find teaching materials and activities. Overall, prompts provided satisfactory responses. This could lead to more efficient use of time and resources, improving educational outcomes.

People have long been fascinated by artificial intelligence research, and this interest seems to be growing. As it is a rapidly developing field with enormous potential and challenges, it needs to be explored for several scientific fields and everyday life. Creating personalized, customized teaching materials with Open AI - ChatGPT or Google Bard.

In addition, the present study indicates that prompt responses are satisfactory, reducing the time it takes to develop teaching materials and finding them. As artificial intelligence becomes more and more sophisticated, an empirically based study of foreign language pedagogy becomes increasingly important. The teachers of foreign languages will therefore be able to formulate objectively informed directives tailored to their needs as a result. Further, research needs to be conducted to explore how artificial intelligence can be used in the broader field of education, with a focus on teachers' and students' distinct roles. Ethics must also be considered when it comes to this deployment.

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