

# PROPOSING A PROCESS FOR APPLYING AI IN TEACHING TO SUPPORT PERSONALIZED LEARNING

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**Abstract:** *The Industrial Revolution 4.0 has overcome the limitations of previous Industrial Revolutions in terms of “massiveness” with modular and customized characteristics. In reality, the world faces the challenge of responding to personalized change. As a field of training human resources for society, the task of education and training is to build and develop personalized learning capacity for learners. Personalization is considered an educational method that focuses on the needs, interests, goals, and abilities of each learner. Personalizing learning is a very difficult process to implement because of its complexity and cost, and it is even impossible without the support of advanced and modern technological means. Because of this, the article proposes the process of applying AI to teaching activities to support personalized learning for learners. By analyzing the stages of the process, educators and educational institutions can harness the potential of AI to improve learning outcomes and enhance the quality of training.*

**Keywords:** *Personalization; Artificial intelligence (AI); Higher education; Process; Application*

## 1. INTRODUCTION

The rapid pace of change of the Industrial Revolution 4.0 is posing unprecedented challenges not only for humanity but also for individuals. The trend of personalization requires each individual to constantly innovate and adapt to rapid changes in his or her capacity, always updating new knowledge. This puts the responsibility on education and training to come up with a more flexible, learner-centered teaching process or model in the direction of individualization to create for learners the habit of self-orientation of lifelong learning. It is a learning model that applies technology to teaching activities, contributing to the personalization of learners in a digital knowledge society.

The progressive educational philosophy of the previous century serves as an inspiration for many of the theories of individualized learning in use today. John Dewey, the author, claims that experiential learning, learner-centered learning, social learning, curriculum extension, and relevance to a changing world are the main focuses of customized learning theory (Dewey, 1915 [1], 1998 [2]).

In the current development era, personalized learning has recently been widely mentioned in many countries, attracting the attention of many education researchers.

Personalized learning becomes a solution that helps learning meet the needs and match the individual experience of each learner, thereby helping learners reach their full potential through customized instructions.

Currently, although personalized learning support has also begun to be implemented through the application of information technology and learning management systems in teaching and learning, there are obvious advantages. However, through teaching practice, personalized learning support for learners is still limited, so it is necessary to have appropriate, specific processes and solutions to enhance and develop. Therefore, in this study, the author focuses on proposing a process for applying AI in teaching to support personalized learning for learners.

## 2. RESEARCH RESULTS

### 2.1. Some related concepts

#### - *Personalization*

In education and training, personalization is an educational method that focuses on the needs, interests, and abilities of each learner based on individual characteristics [3]. Therefore, from the above perspective, it can be understood that personalization can be understood as a teaching and learning method designed to satisfy each individual learner. It emphasizes considering the diversity of learning styles and understandings among learners and strives to optimize each learner's learning experience.

#### - *Personalized learning*

The U.S. Office of Educational Technology [4] defined personalization learning as instruction tailored to learning needs, tailored to learning interests, and tailored to the specific interests of different learners. In a fully personalization environment, learning goals and content, as well as methods and pace, can all vary. So personalization includes differentiation and personalization. This is further explained by the Office of the American Institute of Educational Technology [5]: personalized learning is also instructional, in which the pace of learning and instructional methods are optimized for the needs of each learner. Learning objectives, teaching methods, and teaching content, as well as their sequence, can all vary depending on the needs of each learner. In addition, meaningful and relevant learning activities for learners will be driven by their interests and often self-initiated by learners.

Personalized learning (PL) is defined by the author, Brusilovsky (1998) [6], as computer-aided curriculum systems that select the right content and learning procedure for each learner depending on certain characteristics of the learner model.

All things considered, personalization learning can be defined *as an educational method in which each learner is supported to develop at a pace and in a manner that suits the individual needs, abilities, interests, and learning styles of the learner.*

### - *Personalization learning support*

Theories of personalization learning support emphasize the importance of understanding learners and leveraging existing interests, skills, and knowledge to create a tailored learning experience. With different theories, the concept is also different. Concrete:

+ According to Gardner's (2020) Theory of Interest [7] in Multiple Intelligences, each learner personally possesses a unique set of information. Personalized learning support refers to the identification and growth of each learner's unique intellectual characteristics.

+ Psychology and emotions play a significant role in the learning process, as demonstrated by Goleman's (2001) Theory of Emotional Learning [8]. In order to maximize learning, personalization learning support places a strong emphasis on comprehending and controlling emotions.

+ Vygotsky's (1978) Zone of Proximal Development emphasizes that the best development occurs when learners function at a level that falls between independence and instruction. Personalization learning support focuses on identifying each learner's "potential development area".

+ Knowles' Theory of Self-Learning (1975) [10] proposes that learners are more mature and highly motivated when they are actively engaged in their own learning process. Personalized learning support emphasizes the conditions for self-study and self-management of learners' learning.

+ The Active Learning Theory of Seligman & Csikszentmihalyi (2000) [11] suggests a focus should be placed on developing positivity, optimism, and patience in the learning process. Personalized learning support can focus on encouraging and developing positive learner traits.

From the above analysis, there are many perspectives offered on personalization learning support for learners. Within the framework of the paper's research, personalization learning support is understood as an educational approach that focuses on responding specifically and uniquely to the learning needs of each individual learner.

## **2.2. The role of personalized learning support for learners**

The role of personalized learning support for learners is immense. It allows learners to develop a deeper understanding of concepts, promotes the formation and development of critical thinking and problem-solving skills, and fosters a lifelong love of learning. By tailoring instruction to each learner's individual needs, personalized learning can help close achievement gaps, enhance learner engagement and motivation, and prepare learners for success in a rapidly changing professional world.

## **2.3. Essential elements of personalized learning**

In the study by Mary *et al.*, (2017) [12], the authors indicated and analyzed the essential requirements of personalized learning, including:

- *Use standards to guide content*: Personalization of learning needs to be carried out according to clear guidance with specific criteria and standards. This is a guideline to help teachers understand their direction and learners.

- *Allow flexibility in speed*: this is the hallmark of personalized learning. All learners are not encouraged to learn at the same time and at the same pace. Teachers can know where their learners are by continuously capturing their academic achievements.

- *Shift from teacher-centered to learner-centered learning*: The learning process is transformed based on what learners need, and teachers are the ones who create learning opportunities to ensure that learners can succeed. Teachers provide learning opportunities and experiences that are not tailored to all students but to the individual needs of each learner.

- *Develop learners' initiative*: Learners' autonomy is reflected in the fact that they must set goals and understand what goals they are trying to achieve, then they are given the right to direct and have the right to take control of their learning.

- *Developing the 4Cs*: Personalized learning provides a variety of opportunities to acquire the four essential skills of the 21<sup>st</sup> century, including collaboration skills, critical thinking skills, communication skills, and creative skills.

- *The technology/digital environment is indispensable for the implementation of personalized learning*: Digital learning can accelerate the transition to personalized learning because it provides more content options, expands the integration of the 4Cs, and can promote learners' self-determination. An AI-based learning environment can significantly assist in optimizing both teachers' available learning materials and tools and provide opportunities for effective development for learners themselves to develop and practice.

#### **2.4. The role of AI in teaching to supports personalized learning**

In the context of contemporary education, advances in science and technology, especially artificial intelligence (AI), have ushered in a new era of personalized learning experiences. Through the integration of AI, educational institutions are witnessing significant positive changes in training quality and optimization in education.

AI enhances personalized learning for learners across specific roles, including:

+ *Help learners redefine their motivation to learn*. The application of AI in teaching and learning has created a breakthrough revolution in innovating teaching and learning methods. Using AI to enhance personalized learning experiences for learners in accordance with the needs, perceptions, levels, and interests of each learner, will help learners have the right and appropriate motivation to learn.

+ *Support learners to automate the learning process*. AIs applied in teaching and learning can assist students in automating administrative tasks and allocating resources, thereby enhancing overall efficiency. AI can act as a virtual assistant in the teaching and learning process, which will help learners reduce the burden of unnecessary activities, thereby helping them focus resources on important learning activities. Learning planning,

searching and organizing information sources and materials, automated testing, assessment and timetable adjustment activities, and learning activities can be carried out by assistive AI.

+ *Improve the efficiency of the learning process.* By adapting the teaching content to the interests, abilities, and levels of each learner, AI-powered systems cater to diverse learning styles, promoting more active participation in the learning process of learners. From there, improving the efficiency as well as the quality of learning.

## 2.5. The process of applying AI in teaching to support personalized learning

Teaching reality shows that the application of AI will have certain effects, especially personalized learning support for learners. The process of applying AI in teaching consists of five stages, as shown in Figure 1. These stages are not single construction steps but have an organic and mutual relationship with each other to create a complete and closed process.

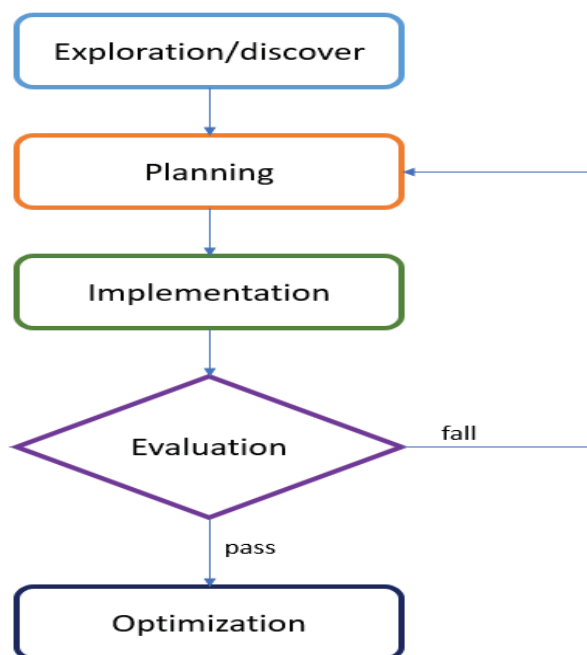


Figure 1. The AI application process in teaching to supports personalized learning for learners

### - Stage 1. Exploration/ discover

The first stage of applying AI in teaching to support personalization learning for learners is discovery. In this stage, lecturers need to explore, explore, and explore the potential applications as well as the implications of AI in different specialized academic fields, depending on the modules the lecturer is in charge. Some considerations as instructors explore AI applications in professional areas to support personalized learning.

+ Determine the situations in which AI can be used in research, education, student management, and teaching.

+ Assess the readiness of the condition of facilities of higher education institutions.

+ Prepare resources as well as professional qualifications to be able to apply AI to teaching and learning.

+ Be mindful of the ethics and social issues of applying AI in higher education settings.

In order for the exploration and discovery stage of teachers to take place smoothly, teachers need to actively participate in or establish interdisciplinary or specialized research groups to approach and explore the application of technology in teaching, especially AI.

Some AI tools that teachers can use to explore technologies and tools that are suitable for teachers to organize personalized teaching can even be used to predict and explore difficulties that learners may encounter in the learning process so that teachers have specific support measures for each learner. Some AI tools include: Dialogflow, Rasa, TensorFlow, PyTorch...

### *- Stage 2. Planning*

After having gained an understanding of the applications of AI in education, teaching, and learning. Instructors make plans to apply AI in teaching to support personalized learning for learners. Activities in the planning phase include defining, setting clear goals, and identifying resources to prepare on both the part of teachers and learners.

Some notes when developing a plan include:

+ Clearly define learning goals, outcome standards, and AI application goals in specialized teaching as well as learning activities.

+ Develop steps in the roadmap to apply AI in higher education, including timelines, durations, and expected scenarios.

+ Establish mechanisms for management, decision-making, and monitoring of implementation activities.

Some AIs can be used during this period: ChatGPT, Elicit, Notion AI, Tome...

### *- Stage 3. Implementation*

With a clear plan in place, teachers implement the established plan. This involves the implementation of AI as well as technologies that can be applied in teaching, integrating them with teachers' pedagogical ideas to help learners build their own appropriate learning process. The implementation process requires careful and close coordination between teachers and learners so that learning activities can take place according to the plan and achieve the set goals.

In the process of implementing the plan, teachers need to select AIs that are suitable for the set goals, providing necessary support for both teachers and learners to apply AI to enhance the process of personalizing learners.

Some AI can be used in this period: AI Personalized Learning, AI - Educational Chatbot, AI in Education - Early Detection and Intervention, AI Automated Learning, Online Education, Game-based learning, AI - Special Needs Support...

#### - Stage 4. Evaluation

Once the set plans have been implemented, the assessment will help teachers and learners see whether the roadmap and implementation plan have met the goals or not. At the same time, the assessment activity also helps teachers and learners evaluate AI tools to realize the goals of individual learners and the goals of the whole educational process. Assessment activities help collect feedback from stakeholders, thereby helping learners adjust their learning activities on their own.

Some AI can be used during this period: AI-powered Assessment Tools, Adaptive Learning Platforms, Gradescope, Turnitin...

#### - Stage 5. Optimization

The final stage in the application of AI in teaching to support learning personalization is the optimization phase. In this period, teachers and learners focus on adapting, improving, and innovating AI application methods to maximize the impact of teaching and learning, the application, and the maximum effectiveness of AI. Optimization in the application of AI involves searching, applying, and exploring the potentials and trends of applying technology and AI in teaching, from which learners find the most suitable method for themselves to achieve their learning goals in the fastest and most effective way.

### 3. CONCLUSION

In addition to the achievements achieved, Revolution 4.0 also poses challenges and tasks for the education and training sectors to build a personalized-oriented teaching model or process focusing on learning based on capacity development to adapt to the movement and development of society. This challenge also confirms that the role of AI in teaching to support personalized learning becomes more meaningful.

Applying AI in teaching to support personalized learning is a complex process with many difficulties and challenges, opening up a new direction in education and training. By understanding personalized learning and understanding the role of AI in education, teachers can apply the 5-stage process to exploit the potential of AI in education to enhance the effectiveness of teaching and learning, guide and help develop personalized learning for each learner.

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