Enhancing Professional Development and Training Through AI for Personalized Learning: A Framework to Engaging Learners

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Received: 15 January 2024
Accepted: 25 February 2024
Date Published Online: 1 June 2024
Published: 1 June 2024

Abstract: *This paper explores the transformative potential of AI-driven personalized learning in enhancing professional development and training programs. As the workforce landscape rapidly changes, the demand for tailored and engaging learning experiences has become increasingly evident. This paper presents a comprehensive framework that leverages artificial intelligence (AI) to determine suitable learning theories and strategies for individual learners, thus promoting higher learner engagement and skill acquisition. Through analysing learner data, preferences, and performance, AI algorithms enable the customization of training content, delivery methods, and assessment strategies. This study builds a design space with three axes to situate and position AI-Driven Personalized Learning in the*

larger research field of professional development and training. This paper presents a comprehensive review of existing literature using the PRISMA systematic review methodology to explore the transformative potential of AI-driven personalized learning on professional development and training. The analysis showcases the potential of AI-driven personalized learning to revolutionize the learning process, catering to individual learner needs, preferences, and pace. By embracing this framework, organizations can foster a culture of continuous learning, empowering professionals to thrive in a dynamic and evolving professional landscape.

Keywords: *Professional Development and Training, Artificial Intelligence, Personalized Learning, Leaners Engagement*

1. INTRODUCTION

The professional development and training landscape is currently undergoing a significant transformation, thanks to the integration of Artificial Intelligence (AI) into educational technologies. The emergence of AI has ushered in innovative approaches to deliver customized learning experiences that align with the unique characteristics and preferences of individual learners. Discussions about computers generating content have been ongoing since the 1950s, with early experiments aiming to mimic human creativity by having computers generate music and visual art (Pataranutaporn et al., 2021). Within the realm of education, AI technology plays a crucial role in predicting learning outcomes, enabling educators to employ tailored learning methods that align with learners' goals and previous achievements. This is achievable through the application of cutting-edge instructional technology, which provides distinctive learning opportunities across various educational contexts.

However, achieving a consensus on the essential considerations for implementing a dynamic personalized learning approach remains a challenge, despite the existence of technology capable of personalizing the learning experience (Shemshack et al., 2021). According to Shemshack et al. (2021), even though a group of learners may find themselves in the same learning environment and participating in similar activities, their

individual perceptions and knowledge acquisition processes can vary significantly. Consequently, educators can enhance their teaching strategies by leveraging AI to gain insights into how each learner uniquely acquires knowledge.

In Malaysia, the Ministry of Education (MOE) distributes 150,000 complimentary laptops and Internet service units to aid individuals classified as underprivileged, falling within the bottom 40% income bracket (B40). Nevertheless, as indicated by a study conducted by Hawati & Khalidi (2020), this initiative proved insufficient as approximately 333,000 learners lacked access to suitable devices for online education. Furthermore, Song et al. (2021) noted that the proliferation of e-learning alone did not create an optimal online learning environment, primarily due to the absence of personalization. Consequently, the responsibility for effective e-learning delivery has been entrusted to educators and trainers, adding to their existing workload, and increasing workplace stress. One potential strategy to mitigate the impact of educator job-related stress involves furnishing them with additional support and skills through professional development (Sandilos et al., 2018). Numerous research studies have underscored the advantages of integrating AI into education (Ouyang et al., 2022).

Nonetheless, it is imperative to recognize that the adoption of AI-based technology by educators is a multifaceted process influenced by their trust in these tools, as confirmed across various domains (Nazaretsky et al., 2022). Therefore, to garner a positive reception, AI must demonstrate its worth to educators and trainers by seamlessly integrating AI technologies into teaching, learning, and administrative processes (Aldosari, 2020). AI, operating on a network platform, effectively analyzes and explores students' learning data while profiling their unique learning characteristics (Zhu, 2019).

According to Bernacki et al. (2021), considering learning characteristics as valuable assets in instructional design renders learning theories pivotal in tailoring personalized learning experiences. Numerous learning theories delve into how specific learner traits influence their interaction with learning tasks, the potential benefits of tasks that incorporate (or exclude) certain features or activities, and how these traits and their interaction with learning impact the outcomes (Bernacki et al., 2021). In light of the

research by Nazaretsky et al. (2022), previous studies predominantly center on the pedagogical and technological facets of educational solutions, often neglecting the holistic integration of human and technological perspectives within the human- machine interaction process. Consequently, the significance of human agency in adopting AI in educational contexts has received limited attention (Nazaretsky et al., 2022).

Hence, this paper introduces a comprehensive framework aimed at harnessing AI tools and techniques to enhance professional development and training. Focusing on the utilization of AI in preparing educators and trainers for effective e-learning delivery, this paper presents an innovative approach that addresses the constraints of traditional methods and empowers both educators and learners in novel ways. The framework for the integration of AI tools into professional development and training contexts aims to bolster learner engagement and, ultimately, optimize learning outcomes. It utilizes AI to discern appropriate learning theories and strategies for individual learners, thereby fostering increased learner engagement and skill acquisition.

2. ARTIFICIAL INTELLIGENCE

Advancements in AI technology is revolutionizing education and enhancing the skills necessary for success in both academic settings and professional environments (Hashim et al., 2022). In Malaysia, AI plays a pivotal role in the ongoing convergence of cutting-edge technologies, including the Internet of Things (IoT), Big Data Analytics, Augmented Reality, Cybersecurity, Simulation, Cloud Computing, Additive Manufacturing, System Integration, and Advanced Material, as part of the fourth industrial revolution (Ministry of International Trade and Industry, 2018). Artificial intelligence relies on algorithms, which are sets of rules and instructions that guide computers in problem-solving tasks, providing the essential directives for AI and machine learning systems (Tapalova & Zhiyenbayeva, 2022).

Machine learning algorithms analyze data to detect patterns, construct models, and make future predictions based on these models (Akgun & Greenhow, 2021). The data analytics capabilities of AI have empowered the education sector to develop more effective technology-enhanced learning systems (Kabudi et al., 2021). Moreover, AI presents an opportunity for

personalized learning by tailoring training to meet the unique needs of learners, thus contributing to the growth of e-learning (Sharma & Dash, 2023). Su & Yang (2023) highlight the increasing attention given to AI in education, with a growing number of educational institutions and organizations exploring the potential benefits of AI-driven technologies such as ChatGPT, an advanced natural language processing (NLP) model. ChatGPT represents a category of extensive language models (Thorp, 2023). These expansive language models belong to the realm of artificial intelligence, harnessing deep learning techniques to analyze and generate text (Shen et al., 2023). Notably, models like the Generative Pre-trained Transformer (GPT-3) undergo training on vast volumes of textual data, enabling them to produce texts that closely resemble human language, accurately respond to queries, and perform various language-related tasks with remarkable precision (Kasneci et al., 2023).

However, as Su & Yang (2023) have observed, ChatGPT has recently found applications in diverse fields, including library services, healthcare, and education. It also serves as a practical tool to enhance AI literacy among educators and learners, which involves the ability to comprehend, employ, and critically assess AI technologies and their societal implications (Su & Yang, 2023). According to Kasneci et al. (2023), extensive language models can additionally support educators by furnishing them with resources, summaries, and explanations related to emerging teaching methods, technologies, and materials. This support enables educators to remain current and enhances the efficacy of their instructional practices.

2.1 PROFESSIONAL DEVELOPMENT AND TRAINING THROUGH AI

In our rapidly evolving contemporary landscape, the ability for professionals to learn and adapt swiftly has become paramount. Traditional methods of professional development and training often fall short in meeting the diverse needs of today's learners, who exhibit a wide range of learning styles and preferences. As Maity (2019) notes, the demands for employee training and development have shifted from mass upskilling in earlier decades to personalized, individualized training tailored to today's requirements. Many current training approaches rely on a single modality, typically lectures, or extend over extended periods (e.g., 2-day workshops).

However, it is essential to acknowledge that the average adult learner's attention span remains abbreviated (Dolasinski & Reynolds, 2020). In the digital age, learners must process and comprehend various textual sources, encompassing not only written texts but also diverse forms of visual content, both static and dynamic (Mason, 2018).

Consequently, large language models like ChatGPT can play a pivotal role in honing field-specific professional skills through tailored training. Furthermore, ChatGPT presents a unique opportunity to deliver personalized, effective learning experiences (Kasneci et al., 2023). These models can enhance the clarity of instructional materials and assist professionals in locating relevant information and resources as they navigate their continuous learning journey. As professionals confront a myriad of new challenges, it is crucial to ensure access to high-quality training during their initial year and provide ongoing professional development opportunities throughout their careers (McGill et al., 2020).

Sustained commitment to professional development remains essential for individuals engaged in the field of education. Zulfikar et al. (2022) characterize teaching as a multifaceted profession, emphasizing the need for educators, instructors, and teaching staff to continuously embrace learning to enhance their professional competence. Teacher professional development encompasses the cultivation of skills, acquisition of knowledge, and the pursuit of ongoing learning opportunities aimed at improving their professional performance (Utami et al., 2019). Simultaneously, educators should possess a comprehensive understanding of digital tools pertinent to their respective fields, necessitating participation in suitable IT-focused professional development courses (Elfeky, 2018).

Conversely, the integration of AI technologies has demonstrated the potential to enhance teaching proficiency (Jaiswal & Arun, 2021) and competence by instilling inspiration and fostering self-reflection (Aldeman et al., 2021). AI empowers educators with valuable professional development resources by furnishing them with teaching evaluation models and offering recommendations for enhancing instructional practices (Adiguzel et al., 2023). A multitude of studies extol the advantages of AI in education, particularly in online higher education settings, where AI aids in predicting student performance, satisfaction, and learning progress, provides resource

recommendations, automates student assessment, and elevates the overall educational experience (Ouyang et al., 2022). Within the framework of extensive language models like ChatGPT, the potential for enriching learning and teaching experiences extends across all levels of education, spanning from primary and secondary to tertiary and professional development (Kasneci et al., 2023).

2.2 AI FOR PERSONALIZE LEARNING

Students' learning experiences vary due to differences in their mastery of underlying knowledge concepts, making learning closely tied to individual learning states (Lv et al., 2018). Consequently, personalized learning has emerged as an educational approach that tailors learning programs to meet the unique needs, skills, and interests of each learner (Somasundaram et al., 2020). Personalized learning considers a learner's prior experiences, background, interests, needs, goals, and motivation (Shemshack & Spector, 2020). Its primary aim is to actively engage students in the learning process, leveraging their interests, talents, and strengths to foster intrinsic motivation and drive towards achievement and success (Hughey, 2020).

Nevertheless, it is a formidable challenge for a teacher to individually monitor and document the progress of 20 students while providing customized instruction (Lee et al., 2018). This is where the widespread application of AI and big data technologies has injected fresh energy into intelligent education, notably through the implementation of learning recommendation systems (Kekang, 2019). With the rapid advancements in AI technology in recent years, the integration of AI in education has become increasingly evident. The advent of these innovative technologies in teaching and learning methods holds immense significance in the classroom

(Shafie, 2019). It equips teachers with access to the most current information, enhancing the attractiveness, ease, relevance, interactivity, and overall effectiveness of their teaching methods (Huang, 2021).

Furthermore, in 2020, Rodzman and colleagues introduced an innovative personalized learning system known as the "Intelligent Online Assessment and Revision." They harnessed rule-based machine learning techniques to enhance learners' performance within the Malaysian context. Their research

documented a substantial 60% boost in learner performance attributed to the utilization of this tailored system. Consequently, a plethora of online learning platforms, adept at offering diverse educational resources, have emerged (Wei et al., 2021). Nevertheless, Wu et al. (2020) contended that students typically struggle to efficiently sift through this vast array of resources, often resulting in decreased attention and diminished learning efficacy. Precise resource allocation, aligned with students' interests and individual traits, becomes paramount in addressing this issue.

This study has leveraged AI technology and principles from educational psychology to formulate a personalized online learning resource recommendation strategy aimed at enhancing students' academic outcomes. Thus, the precise curation and delivery of relevant learning materials to individual students, based on their preferences and characteristics, is a critical endeavour (Wu et al., 2020). For instance, educational recommendation systems have gained traction, offering students a variety of resource formats such as articles, websites, and video courses (Wei et al., 2021). Furthermore, Walkington and Bernacki (2020) have developed frameworks for instructional design and personalized learning, tailored to the principles of various learning theories, as depicted in Figure 1.

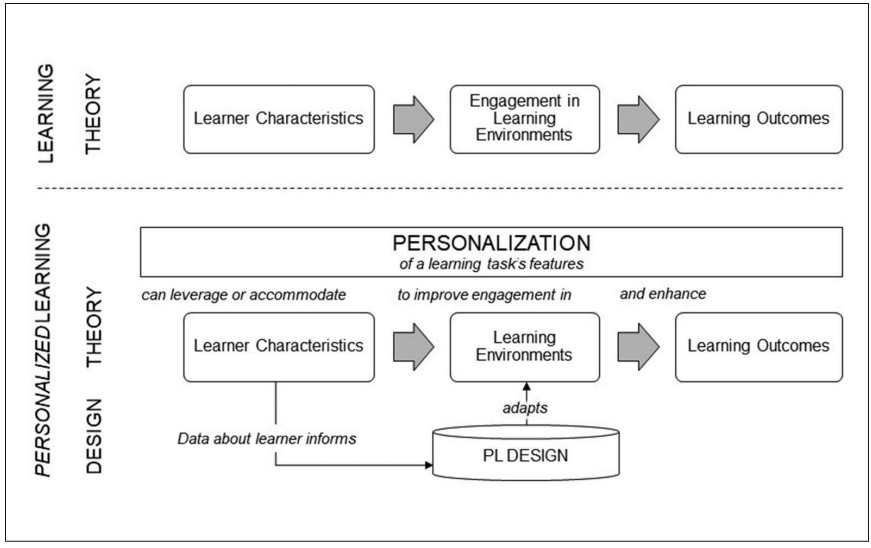

Fig. 1 Instructional design and personalized instructional design processes (Walkington & Bernacki, 2020)

2.3 PERSONALIZE LEARNING AND LEARNING THEORY

Personalized learning has been effectively implemented through intelligent learning systems, primarily focusing on factors such as accommodating individual preferences, analysing unique learning data, and constructing learner profiles. These systems dynamically facilitate the learning process (Shemshack et al., 2021). Personalized learning tailors educational experiences to meet individual needs, adjusting elements such as learning pace, materials, sequencing, technology integration, material quality, instructional methods, and learning resources. However, summarizing the impact of personalized learning on the learner experience, learning processes, or academic achievements is challenging. Doing so risks falling into the "jingle jangle fallacy," where various forms of personalized instruction are conflated under a broad and imprecise label of "personalized learning" (Gonzalez et al., 2020).

Schmid and Petko (2019) have highlighted that the international research literature reflects the multifaceted nature of personalized learning, featuring numerous definitions and diverse implementation approaches. Furthermore, Bernacki et al. (2021) have observed that, despite some commonalities among operational definitions of personalized learning, researchers rarely provide substantial alignment with widely accepted definitions of personalized education or the learning theories that informed their study designs. Consequently, there is an opportunity to employ learning theory as a guiding framework for personalizing educational experiences, improving student learning outcomes, and providing empirical evidence to refine learning theories (Bernacki et al., 2021).

As per Corbett & Spinello (2020), learning theories offer valuable insights into humanity's critical thinking, self-development, and overall growth. These theories serve as a foundational framework for instructional design, enabling educators to create effective learning environments where both young and adult learners can optimize their educational journeys (Corbett & Spinello, 2020). Various learning theories have been instrumental in motivating and supporting personalized learning interventions, as illustrated by the findings of Walkington & Bernacki (2020). Their research highlights the significance of concurrently applying theories related to interest development and the acquisition of knowledge to comprehend

how personalized learning influences performance and interest. Humanistic learning theory, constructivist learning theory, and the theory of multiple intelligences provide the theoretical underpinnings for personalized learning, serving as the foundation for network-based personalized teaching (Zhou, 2018).

Delving into the nuances of these learning theories and substantiating design choices based on specific theoretical assumptions enables educators to make clearer, more informed decisions. Drawing from prior evidence, designers can confidently anticipate that their efforts will yield desired outcomes (Walkington & Bernacki, 2020). Furthermore, the integration of technology should be closely aligned with educational and learning theories to guide instructional design and technological advancements (Bower, 2019). Therefore, the process of personalizing learning necessitates that the learning environment be responsive to these elements, promoting increased engagement and performance in learning tasks through the application of learning theories.

3. METHODOLOGY

The research adopted the PRISMA systematic review methodology to conduct a thorough analysis and synthesis of existing literature concerning the application of artificial intelligence in personalized learning within professional development and training contexts. To ensure a comprehensive review, a systematic search was systematically carried out across reputable academic databases. Stringent inclusion and exclusion criteria were meticulously applied to guarantee the selection of high-quality studies aligning with the research objectives. Adhering to PRISMA guidelines, this investigation meticulously curated the following renowned and reliable databases for the literature review: Scopus, Science Direct, IEEE Xplore, JSTOR, and Web of Science, thus encompassing all relevant journals in the field (Shemshack & Spector, 2020). The selection of pertinent journals was consistently maintained across these databases. Specifically, peer-reviewed articles from online journals were exclusively considered, as these online academic sources are recognized for their reliability and authority (Shemshack et al., 2021).

The review deliberately excluded editorials, letters, opinion articles, commentaries, essays, and preliminary notes. The scope of this study was deliberately confined to journals, ensuring the manageability of the review and the provision of meticulously reviewed data, which can serve as a valuable resource for future research endeavors (Shemshack & Spector, 2020). Relevant papers were initially identified through comprehensive searches of online databases and journals. Subsequently, these papers underwent a rigorous assessment to determine their relevance to the study's objectives. The literature search was initially conducted in 2018 and subsequently updated in 2023. Throughout these searches, various combinations of search terms, such as "professional development and training," "artificial intelligence," "personalized learning," "engaging learners," and "learning theory," were employed to ensure a comprehensive exploration of the subject matter.

Articles for review were selected based on their content quality and relevance to the study's objectives. This research conducted a thorough analysis of these articles to provide a comprehensive examination of the components of personalized learning, which offer distinctive educational experiences to individuals. To ensure clarity for readers, the researchers elucidated the study's purpose and intended goals (Shemshack et al., 2021). In the initial screening phase, 15 articles were excluded, while in the subsequent phase, 54 articles were chosen for in-depth review. The 15 rejected articles were disqualified for various reasons: 10 did not pertain to artificial intelligence, 3 were unrelated to learning theory, and 2 did not address personalized learning. In the selection phase, each of the 52 chosen articles underwent a thorough examination according to specific eligibility criteria.

These eligibility criteria encompassed three key aspects (1) the full article must contain a review of multiple studies, (2) the article should present evidence of educational potential through a well-structured research methodology, and (3) the article must include an experimental application that assesses the effectiveness of the model under examination in distance education, be it at various educational levels or within employee training programs. From an initial pool of 67 sources, 52 articles specifically related to personalized learning and learning theory were meticulously selected. These articles served as the foundation for identifying key strategies and solutions aimed at bridging the gap in professional development and training through the integration of artificial intelligence.

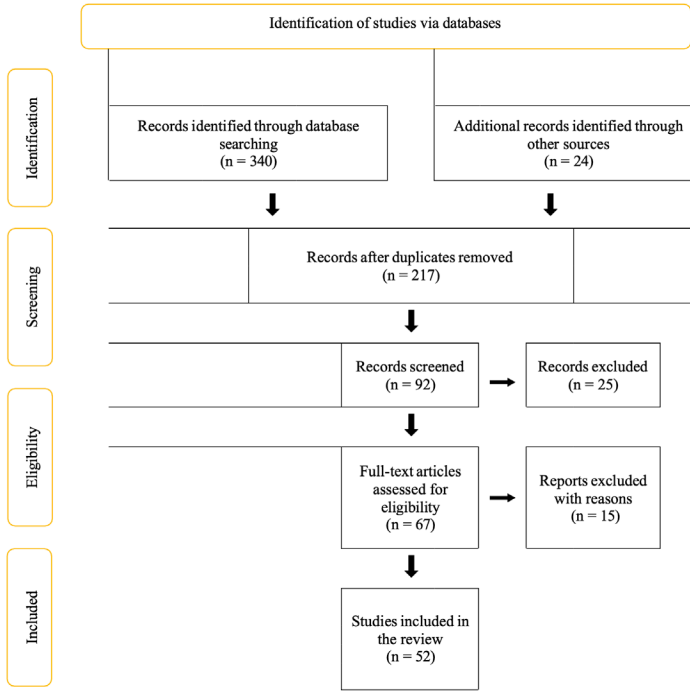

Figure 1. PRISMA model describing systematic review methodology

4. DISCUSSION

The integration of Artificial Intelligence (AI) into professional development and training is reshaping the educational landscape, offering unprecedented opportunities for personalized learning experiences. Nevertheless, the road to achieving a truly dynamic and personalized learning approach remains challenging. Variations in learner characteristics and perceptions persist within shared learning environments, emphasizing the need for educators to harness AI's capabilities to optimize teaching strategies and ensure diverse learners' success. In the context of Malaysia, where digital inequality is a pressing issue, AI-driven solutions hold promise in bridging the gap in online education access and personalization. Additionally, educators, burdened

with increasing responsibilities, can alleviate job-related stress through professional development opportunities enhanced by AI. While trust in AI tools is a critical factor influencing their adoption, the potential benefits of AI in education are undeniable. As we navigate the evolving educational landscape, the symbiotic relationship between human agency and AI technologies is central to successful AI adoption in educational settings. Embracing AI's transformative potential in professional development and training holds the promise of enriching learning experiences and optimizing educational outcomes for learners worldwide. It is imperative that stakeholders recognize AI as an asset and incorporate AI technologies into various aspects of education to foster positive attitudes and promote continuous improvement in teaching and learning practices.

AI and technology advancements are reshaping education in Malaysia and beyond. AI, along with IoT, Big Data Analytics, and more, is at the heart of the fourth industrial revolution. Algorithms drive AI and machine

learning systems, enabling problem-solving and data analysis. AI's data analytics capabilities have improved technology-enhanced learning systems, offering personalized learning tailored to individual needs. The use of AI in education is on the rise, with tools like ChatGPT gaining attention. ChatGPT, a large language model, is a powerful AI tool that can generate human-like text, answer questions, and perform various language-related tasks with high accuracy. While some praise its potential, concerns arise regarding its impact on knowledge work and decision-making. Despite these concerns, ChatGPT finds applications in various fields, including library services, healthcare, and education. It also plays a role in enhancing AI literacy among teachers and students, helping them understand and critically evaluate AI technologies' societal impact. Large language models like ChatGPT assist teachers by providing resources, summaries, and explanations of new teaching methodologies, technologies, and materials. This support contributes to effective teaching and keeps educators up-to-date in the ever-evolving landscape of education technology. AI's transformative influence on education is undeniable, offering both opportunities and challenges in the pursuit of improved learning experiences.

4.1 AI ASSISTING EDUCATORS AND TRAINERS

In the fast-paced world of today, professionals face the crucial need to continuously learn and adapt. Traditional training methods no longer suffice, as modern learners have diverse styles and preferences. The shift in training and development from mass upskilling to personalized, individualized approaches is evident. Current training often relies on single modalities like lectures, even though adult learners have shorter attention spans. In the digital age, learners must process various textual and visual sources, creating a demand for effective, adaptable training. Large language models like ChatGPT emerge as valuable tools for tailored professional training. They offer opportunities for personalized learning experiences, improving teaching materials' clarity and facilitating resource location for on-the-job learning. Quality training is essential not only at the beginning of one's career but throughout it, as professionals continually face new challenges. Teaching requires constant learning and professional development. Educators must stay updated on digital tools and teaching skills. AI technologies, including ChatGPT, have been proven to enhance teaching skills and competence by providing evaluation models and suggestions for improvement. AI's benefits extend to predicting student performance, offering resource recommendations, automating assessments, and enhancing the overall learning experience in higher education. The potential of large language models like ChatGPT to enhance learning and teaching experiences spans all levels of education, from primary to professional development. They hold the promise of adapting to the evolving needs of modern learners and educators, ushering in a new era of personalized, effective training.

Although personalized learning has become increasingly important in education, it's nearly impossible for a teacher to monitor and provide customized instruction for each individual in a classroom with multiple students. To address this challenge, AI and big data technologies have introduced intelligent education tools like learning recommendation systems. These systems rely on learner modelling to offer accurate and high-quality personalized learning recommendations. The integration of AI technology into education has transformed teaching and learning methods, providing teachers with access to current information, enhancing the learning experience through attractiveness, relevance, and interactivity. Moreover, personalized learning systems, like the one developed by Rodzman et al.,

have demonstrated significant improvements in learner performance. As the volume of learning resources available online continues to grow, students often struggle to find content suited to their needs and interests, leading to reduced attention and learning efficiency. To address this, AI technology and educational psychology theories are being used to design personalized online learning resource recommendation schemes. These schemes aim to precisely match appropriate resources with students based on their interests and characteristics, offering various forms of content like articles, websites, and video courses. Overall, personalized learning, driven by AI and data technologies, is reshaping education by addressing individual student needs and improving learning outcomes. It promises to revolutionize the way students' access and engage with educational content.

4.2 FRAMEWORK DEVELOPMENT

Several learning theories underpin personalized learning, including humanistic, constructivist, and multiple intelligence theories. These theories inform the theoretical basis for personalized teaching in networked environments. When designers consider these theories in detail and substantiate their design choices based on specific theoretical assumptions, it leads to clearer and more effective instructional design. Moreover, the integration of technology into personalized learning should be closely connected with educational and learning theory. This alignment informs both instructional design and technological development, ensuring that the learning environment is responsive and promotes engagement and performance in line with learning theories. Thus, personalized learning offers a flexible and tailored approach to education. Its effectiveness relies on a deep understanding of learning theory and the careful alignment of instructional design with theoretical principles.

Table 1 summarises three major learning theories form the literature review to be used in the framework which consistent of Behaviourism, Constructivism and Social Learning Theory.

Learner Characteristic	Behaviorism	Constructivism	Social Learning Theory
Role of Prior Knowledge	Limited emphasis on prior knowledge; learning is seen as a response to stimuli and reinforcement.	Prior knowledge is considered essential; learners build new knowledge on their existing understanding.	Prior knowledge influences social learning; learners observe and model behaviors based on what they already know.
Motivation Source	External rewards and punishments drive motivation; extrinsic motivation is prominent.	Intrinsic motivation is encouraged; learners are motivated by personal curiosity and interest in the subject matter.	Both intrinsic and extrinsic motivation play a role; learners can be motivated by both internal interest and external rewards or recognition.
Active Engagement	Learners are often passive receivers of information and are expected to respond to stimuli or conditioning.	Active engagement is emphasized; learners are encouraged to explore, question, and construct knowledge actively.	Active participation in social interactions is central; learning occurs through observation, imitation, and active engagement with others.

Table 1. Learners' characteristic of learning theory

This paper introduces a comprehensive framework that leverages AI to elevate professional development and training. It addresses the limitations of conventional methods, empowering educators, and learners alike by integrating AI to identify suitable learning theories and strategies. Based on the instructional design and personalized instructional design processes by Walkington & Bernacki (2020), this study adapts the process and introduce AI for effective e-learning delivery by educators and trainers. Through using AI such as ChatGPT to construct the type of learning theory, the framework leverage learner characteristics to provide instruction to ChatGPT according to the prompt. The learner characteristics provided to the prompt in ChatGPT will generate the type of learning theory for the learner. From the learning theory suggested by the ChatGPT, the educator or trainer will provide ChatGPT the personalized learning components for the following process to adapt into the learning environment.

In this perspective, ChatGPT is being used to generate the suitable learning theory according to the learner characteristics by providing the prompt into the chat box and proceeding to assist on the personalised learning

design. With the intention of contextualizing and positioning the learner characteristic of learning theory in the ChatGPT OpenAI platform, this study constructed a design space with three axes consisting of Role of Prior Knowledge, Motivation Source, and Active Engagement (Figure 2). The learner characteristic is the measurements that are varying degrees of ability measuring each of the learning theories. For example, a learner characteristic of greater prior knowledge can be more related to the theories that require an essential consideration on their existing understanding whereby, lowering the level of prior knowledge can be considered for theories with limited emphasis on prior knowledge.

Similarly, the learner characteristic of motivation source can be the higher requirement for a learning theory that drives motivation whereby, lower measurements contribute to a learning theory with learners who possess curiosity and interest in the subject matter. Active engagement of the learner characteristic will vary from passive to active engagement learning theory. These learner characteristic differences highlight how learners are viewed and engaged with in behaviourism, constructivism, and social learning theory. Each theory has its own perspective on how learners' prior knowledge, motivation, and active engagement influence the learning process. The AI- generated learning theory is like the educational psychology theory but the purpose of integrating ChatGPT is to empower educators to identify suitable learning theories.

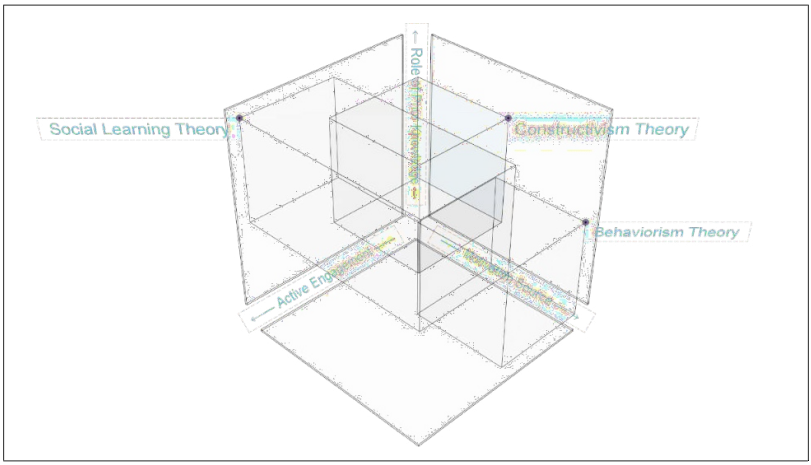

Figure. 2 Three Axes Learning Theory Design Space

5. CONCLUSION

The integration of Artificial Intelligence (AI) into professional development and training is reshaping education, offering the potential for highly personalized learning experiences. However, it is crucial to recognize that the journey towards fully realizing this dynamic and personalized learning approach is complex and multifaceted. In Malaysia and globally, the adoption of AI in education holds the promise of addressing various challenges. It has the potential to bridge the digital divide in online education access and alleviate the burden on educators by enhancing professional development opportunities. Trust in AI tools is essential for their successful adoption. The symbiotic relationship between human agency and AI technologies is central to their effective implementation in educational settings. Embracing AI's transformative potential in professional development and training can enrich learning experiences and optimize educational outcomes for learners worldwide. The discussion also extends to personalized learning, which leverages AI and data technologies to tailor education to individual preferences and needs. This approach addresses the diverse nature of learners within shared environments. However, it is important to recognize the complexity and diversity of personalized learning definitions and implementations, which can make summarizing its effects challenging.

Learning theories play a vital role in guiding instructional design and creating effective learning environments. These theories, including humanistic, constructivist, and multiple intelligence theories, underpin personalized learning. When educators consider these theories in detail and align their design choices with theoretical principles, they can create more effective instructional strategies. Furthermore, the integration of technology into personalized learning should be closely aligned with educational and learning theories. This alignment informs instructional design and technological development, ensuring that the learning environment remains responsive and promotes engagement and performance in line with these theories. Hence, this study proposes a three axes design space with the intention of contextualizing and positioning the learner characteristic of learning theory in the ChatGPT OpenAI platform. The purpose of integrating ChatGPT in defining the learning theory is to empower educators and learners alike by integrating AI to identify suitable learning theories and strategies. In conclusion, the integration of AI and personalized learning into

education has the potential to revolutionize the field. Still, it requires a deep understanding of learning theories, careful alignment of instructional design, and a recognition of the symbiotic relationship between human educators and AI technologies. As we navigate the evolving educational landscape, stakeholders must recognize AI as an asset and incorporate it into various aspects of education to enhance teaching and learning practices.

6. ACKNOWLEDGEMENTS

We wish to express our sincere appreciation and gratitude to the Arshad Ayub Graduate Business School (AAGBS) and Universiti Teknologi MARA (UiTM) for their unwavering support and valuable contributions to this research. Their steadfast commitment to academic excellence and their dedication to creating an environment

conducive to research have played a pivotal role in the successful completion of this conference paper. We would also like to extend our heartfelt thanks to the esteemed faculty members, researchers, and dedicated staff of AAGBS. Their guidance, expertise, and invaluable insights have been instrumental at every stage of our research journey. Their inputs and constructive feedback have significantly elevated the quality and rigor of this study. We remain deeply grateful to all the individuals and institutions mentioned above for their invaluable contributions and unwavering support throughout this research endeavour. It is important to acknowledge that without their generous assistance, this work would not have been possible.

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