AI-Integrated Transformative Learning Model to Strengthen the Personal and Interpersonal Dimensions of Lifelong Learning Capacity among Community Education Students at Universitas Negeri Jakarta

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Abstract. This study develops and implements an artificial intelligence integrated transformative learning model to strengthen lifelong learning capacity among prospective community educators, with emphasis on two core dimensions: (1) personal competence (fostering fully autonomous, self-directed learners) and (2) interpersonal competence (nurturing effective communicators, collaborative team members, and proactive networkers). Grounded in transformative learning theory and enhanced by the adaptive capabilities of artificial intelligence (ai), the model provides personalized learning pathways, real-time responsiveness, and context-sensitive support tailored to individual learner trajectories. The study employed a pre-experimental one-group pretest-posttest design within a transformative learning and critical pedagogy course at universitas negeri jakarta. Data were collected through validated questionnaires and analyzed using the nonparametric wilcoxon signed-rank test due to the non-normal distribution of the data. Results indicated a statistically significant improvement in personal competence from pretest to posttest (z1= -3,672, p1= 0,0001) and interpersonal competence from pretest to posttest (z2 = -3,355, p2 = 0,001), demonstrating the model's effectiveness in enhancing key lifelong learning capacities. The integration of humanistic, dialogic pedagogy with ai-driven personalization offers a novel, scalable, and operationally viable approach to cultivating adaptive, reflective, and socially connected educators for today's complex and evolving educational landscapes. This study contributes a practical and evidence-based framework aligned with 21st-century educational demands.

Keywords: Transformative learning, Lifelonglearning, Community Education

1. INTRODUCTION

The world today is undergoing rapid transformation, driven by technological advancement, globalization, and complex socio-economic challenges. In this context, the capacity for lifelong learning has become a key competency that every individual, particularly prospective community educators must possess. Community educators are not merely knowledge transmitters, they are facilitators of profound shifts in learn ways of thinking, attitudes, and actions as they navigate an increasingly dynamic world. Hence, transformative learning which emphasizes deep, meaningful changes in individuals' perspectives and behaviors is highly relevant. However, traditional education often remains entrenched in rigid, one-way, and non-adaptive instructional models. This creates a gap between the real-life learning needs of individuals and what formal education systems deliver, leaving prospective community educators inadequately prepared to address 21st-century and digital-era learning challenges.

Technological advancements, particularly in Artificial Intelligence (AI), have opened significant opportunities to revolutionize education. AI can rapidly analyze data, deliver personalized learning recommendations, and create adaptive, responsive interactions for users. It holds the potential to overcome key limitations of traditional education, such as limited access to contextually relevant learning resources, insufficient individualized support, and inflexible learning processes. AI applications in education are already emerging, including educational chatbots, adaptive

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learning platforms, and intelligent recommendation systems. Nevertheless, the integration of AI into transformative learning models remains underexplored, especially in the context of strengthening lifelong learning capacities among prospective community educators. In fact, combining transformative learning with AI offers a promising pathway toward creating educational models that are not only effective but also inclusive and sustainable.

Community educators play a strategic role in shaping generations capable of adapting to change. Therefore, prospective community educators must be equipped with robust lifelong learning capacities such as encompassing self-directed development, critical thinking, and adaptability to novel situations. Unfortunately, current learning models do not fully support this development. An AI-integrated transformative learning model presents a potential solution to this challenge by: (1) offering personalized and adaptive learning experiences tailored to individual needs; (2) supporting deep reflection and perspective transformation through meaningful human–technology interactions; and (3) facilitating continuous self-directed learning through access to intelligent, responsive digital resources.

This study aims to develop an AI-integrated transformative learning model to strengthen the lifelong learning capacities of prospective community educators. The expected contributions of this research to the field of education include: (1) improving the quality of learning for prospective community educators; (2) producing AI-based instructional materials applicable in university courses or training programs; and (3) delivering a replicable learning model adaptable to diverse educational contexts. Thus, the study holds both academic relevance and significant practical impact in addressing future educational challenges.

However, several obstacles persist in implementing transformative learning models, including ineffective integration of AI technologies, low digital literacy among prospective educators, and a lack of strong empirical evidence demonstrating the model's impact on lifelong learning capacity within a short timeframe (Boot 2022; Hawk 2011). This research therefore seeks to evaluate the effectiveness of an AI-Integrated Transformative Learning Model in enhancing the lifelong learning capacities of prospective community educators over a six-month period. The main research question of this research, Is the AI-integrated transformative learning effectively in improving lifelong learning capacity within a short timeframe?

To address these questions, the study employs a pre-experimental design using a one-group pretest posttest. This method was selected because it enables direct measurement of the intervention's impact, namely, the AI-integrated transformative learning model on the dependent variable (lifelong learning capacity) by comparing pretest and posttest results (Crawford et al. 2023; Nofriansyah 2019; Olivier 2021; Taylor and Laros 2014). The independent variable is the implementation of the AI-integrated transformative learning model, while the dependent variable is the improvement in lifelong learning capacity, measured quantitatively through pretest and posttest assessments (Laal, Laal, and Aliramaei 2014; Tan 2017).

From a state-of-the-art perspective, this research demonstrates novelty by integrating the humanistic principles of transformative learning with the data-driven capabilities of AI. Most prior studies have focused exclusively on either conventional transformative learning models (Hall and Williams 2016) or AI applications in education without considering learners' inner transformation (Cochrane et al. 2017; Ducich et al. 2016; Peltz and Clemons 2018; Şahin and Doğantay 2018). This study further distinguishes itself by adopting a pre-experimental approach to provide empirical evidence of the model's short-term effectiveness, a rare feature in similar research. Additional innovation lies in leveraging AI not only for content personalization but also for real-time learning analytics and adaptive recommendation of learning materials tailored to individual learner needs (Park and 김영석 2015; Wozniak 2020).

2. MATERIALS AND METHOD

This study was designed using a quantitative approach to develop and evaluate the effectiveness of an artificial intelligence (AI)-integrated transformative learning model in enhancing the lifelong learning capacity of prospective community educators especially as adult education educator professional. The research process began with a preparatory phase involving an in-depth literature review to gather references on transformative learning, the application of ai in education, and the concept of lifelong learning. Subsequently, a pre-experimental design was developed using a one-group pretest–posttest method. A sample of 82 students of Community Education of Universitas Negeri Jakarta who joined the subject transformative learning and critical pedagogy was selected from a population of 121 using cluster random sampling. The selected participants were then exposed to an intervention based on the ai-integrated transformative learning model.

Following preparation, the intervention commenced with an initial training session for participants on the use and application of ai technologies in learning. The model was implemented over a six-week period, during which

instruction was delivered via a purpose-built ai platform designed to support personalized and adaptive learning experiences tailored to individual needs.

Throughout the implementation phase, data were collected through pretests, posttests, questionnaires, and classroom observations to assess the model's impact on participants' general competence knowledge and understanding as future adult educator professional. There are 7 indicators of general competence that should possesed by professional adult educators by Research voor Beleid, but in this article only focus on 2 indicators which are personal competence and interpersonal competence. The collected data were analyzed using non-parametric statistics, specifically the wilcoxon signed-rank test, to measure the model's effectiveness and examine the relationship between the independent variable (implementation of the ai-integrated transformative learning model) and the dependent variable (improvement in lifelong learning capacity).

3. RESULTS AND DISCUSSIONS

This study focuses on strengthening the cognitive understanding of prospective community educators regarding lifelong learning competencies essential for their role as adult educators. Specifically, this article examines two of the seven core competencies that prospective community educators must develop to become professional adult educators, as outlined by (Buiskool et al. 2010): 1) Personal competence (functioning as an autonomous or self-directed lifelong learner); 2) Interpersonal competence (acting as an effective communicator, collaborative team member, and network builder).

These two competencies serve as key indicators to assess the extent to which prospective community educators grasp the foundational attributes required for professional practice, particularly within the course *"Transformative Learning and Critical Pedagogy".* This course was selected due to its strong alignment with the broader goal of cultivating high-quality community educators, as its theoretical and pedagogical frameworks directly support the development of these essential competencies. The instructional implementation in this course followed a structured sequence:

1. Week 1, Pretest: At the outset, participants completed a pretest instrument developed by the research team to measure their baseline understanding of the seven competencies required of professional adult educators.
2. Weeks 2 and 3, AI-Integrated Learning Activities: The instructor introduced foundational concepts and discourses related to professional adult education. Students were then divided into seven small groups to conduct focus group discussions (FGDs), each assigned to explore one of the seven competencies. During the FGDs, each group used large paper and markers to collaboratively construct a mind map summarizing their discussion. Subsequently, participants were instructed to utilize an AI-powered chatbot to deepen their conceptual exploration, generate ideas, and identify best practices associated with their assigned competency. Each group was responsible for synthesizing insights, preparing a class presentation, and integrating their findings into a cohesive understanding of professional adult educator identity. Throughout this process, the instructor actively facilitated discussions, provided guidance when confusion arose, and supported critical reflection. Following the group presentations, participants engaged in collective reflection to unify the individual competencies into an integrated conceptual framework of professional adult educators, culminating in group-developed conclusions for the learning session.
3. Final Stage, Posttest: A posttest was administered to determine whether there was a statistically significant improvement in participants understanding of the seven professional competencies for adult educators.

The data obtained from this research are presented as follows:

TABLE 1. The Result

No.	Indicators	Z-Score	Asymp. Sig. (2-tailed)	Explanation (Significant	Interpretation
1.	Indicator 1	-3.672	0.000	$p < 0.05$ (Significant)	There was a statistically significant difference between the pre-test and post-test scores on Indicator 1. This indicates that the instructional

					intervention implemented had a positive impact on participants' learning outcomes.
2.	Indicator 2	-3.355	0.001	$p < 0.05$ (Significant)	There was a statistically significant difference between the pre-test and post-test scores on Indicator 1. This indicates that the instructional intervention implemented had a positive impact on participants' learning outcomes.

According to the results of the Wilcoxon Signed-Ranks Test for both indicators, all Asymp. Sig. (2-tailed) values were below 0.05. This indicates a statistically significant difference between pretest and posttest scores across all measured indicators. In other words, the instructional intervention led to a measurable and meaningful improvement in participants' competencies. The negative Z-values ($Z_1 = -3.672$ and $Z_2 = -3.355$) further corroborate this finding, confirming that posttest scores were consistently higher than pretest scores, thereby demonstrating a clear enhancement in learning outcomes. Overall, it can be concluded that the implemented learning model was effective and exerted a positive influence on participants' performance across all assessed indicators.

These findings align closely with Malcolm Knowles' principles of andragogy, which posit that adult learning is inherently self-directed, experience-based, relevant to real-life contexts, and oriented toward solving practical problems (Pines 2010; Purwanti 2017). The significant improvement observed particularly in personal competence as autonomous lifelong learners and in the ability to empower adult learners illustrates the success of a pedagogical approach that views prospective community educators not merely as passive recipients of knowledge, but as active agents in their own learning process. This is further consistent with andragogical assumptions that adults are most motivated to learn when they perceive the direct relevance of the content to their roles and responsibilities in society.

4. CONCLUSIONS

This study provides compelling evidence that an ai-integrated transformative learning model is effective in enhancing the lifelong learning capacity of prospective community educators within a short instructional timeframe. The statistically significant improvements observed in both personal competence, specifically the ability to function as an autonomous, self-directed lifelong learner and interpersonal competence, encompassing communication, collaboration, and networking to demonstrate the positive impact of the intervention. The wilcoxon signed-ranks test results ($Z1 = -3.672$, $P < 0.001$; $Z2 = -3.355$, $P = 0.001$) confirm that posttest scores were substantially higher than pretest scores, indicating meaningful gains in participants' cognitive understanding and professional readiness.

The integration of AI as a dialogic and exploratory tool, combined with collaborative, reflection-based learning activities grounded in transformative pedagogy, created a dynamic and relevant learning environment aligned with andragogical principles. By positioning learners as active co-constructors of knowledge rather than passive recipients, the intervention fostered critical engagement, self-direction, and contextual relevance, all of which are central to adult learning.

Thus, in direct response to the research question *"is the ai-integrated transformative learning model effective in improving lifelong learning capacity within a short timeframe?"* the findings affirm that it is. This approach not only strengthens foundational competencies for professional adult educators but also offers a scalable, innovative framework for 21st-century community educator preparation that bridges theory, technology, and transformative practice.

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