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**Regular Article**

**Artificial Intelligence-based transformative training for secondary school teachers in the context of the Egyptian secondary education system's specialization tracks.**

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• **Abstract:**

This study explores the implementation of AI-based transformative training for secondary school teachers within the Egyptian education system and evaluates the influence of various AI dimensions on their professional development. Adopting a descriptive research design, the study utilized a comprehensive questionnaire encompassing eight key dimensions: (1) AI-enhanced cognitive processes and understanding, (2) AI-supported emotional intelligence and awareness, (3) AI-guided behavioral adaptation, (4) AI-facilitated communication and collaboration, (5) AI-driven self-reflection and lifelong learning, (6) AI-based personal motivation and goal-setting, (7) fostering a global perspective and identity transformation through AI, and (8) promoting sustainable change via AI integration. The questionnaire was administered to 148 secondary school teachers across Port Said Governorate. Based on the findings, the study proposed several actionable recommendations, including the establishment of specialized AI-based training units within educational directorates, the development of a prioritized list of AI training needs as identified by secondary school teachers across various subjects, and the implementation of continuous professional development workshops that leverage diverse AI applications. Additionally, the study recommended instituting individual and group assessment frameworks to monitor teachers' performance and measure the impact of AI-based training, organizing AI-centered educational competitions for both teachers and students at the secondary level, and providing both material and non-material incentives to encourage the integration of AI technologies into teaching practices.

**Keywords:** transformative training, artificial intelligence, secondary school teachers, Professional Development, Continuous Assessment, Instructional Practices

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## **1. Introduction:**

The rapid advancement of artificial intelligence (AI) has significantly impacted various educational domains, offering transformative opportunities for teaching and learning. In the context of secondary education, AI-based training programs are emerging as innovative solutions to enhance the effectiveness of teaching methodologies. With its recent emphasis on specialization tracks, the Egyptian secondary education system presents a unique opportunity to integrate AI-driven approaches into teacher training, specifically for post-service educators responsible for delivering courses at the secondary school level.

Post-service teachers, who have already completed their initial teacher education and are actively engaged in the profession, face distinct challenges when adapting to new educational frameworks and technologies. The specialization tracks within the Egyptian secondary education system require these educators to develop more specialized knowledge and skills in their subject areas. AI-based transformative training can play a crucial role in addressing these needs by providing personalized learning experiences, real-time feedback, and advanced pedagogical tools that align with the evolving educational landscape.

This study explores the effectiveness of AI-based transformative training for post-service secondary school teachers within the Egyptian secondary education system's specialization tracks. By examining AI's potential to enhance teaching practices, improve content delivery, and support continuous professional development, this study seeks to contribute to the broader discourse on the integration of AI in education.

## **2. Statement of the problem:**

Transformative training is pivotal for equipping secondary school teachers to thrive in a dynamic educational landscape, enabling them to remain both effective and adaptable (Leithwood & Sun, 2012). Unlike pre-service programs that focus on foundational skills, post-service transformative training emphasizes ongoing professional growth, allowing teachers to enhance their expertise, integrate innovative pedagogical strategies, and cater to the diverse demands of modern secondary education (Higginbotham, 2019; Wang, 2023). Rooted in the principles of critical pedagogy and social constructivism, transformative training prioritizes equity, social justice, and reflective practices, empowering educators to confront systemic inequities and embrace culturally responsive teaching approaches (Farren, 2016; Spear & Costa, 2018; Bürgener & Barth, 2018). Advancements in AI-powered transformative training further revolutionize this paradigm by delivering personalized, data-driven learning experiences that offer real-time feedback and adaptive, goal-oriented modules tailored to individual educators (Shi, 2021; Kusmawan, 2023). These AI systems not only enhance teacher capacity by providing access to cutting-edge resources and fostering global professional collaboration but also cultivate a culture of perpetual learning and pedagogical innovation (AlHarbi et al., 2024; Tammets & Ley, 2023; Moussa & Amer, 2024). The synergy of traditional and AI-driven approaches prepares educators to meet the unique challenges of Egypt's specialized secondary education tracks, ensuring the delivery of inclusive, socially relevant, and technologically sophisticated instruction that addresses the complexities of contemporary education.

Teachers face numerous new challenges arising from the technological and informational revolution, which demand their adaptation and performance enhancement through AI-based transformative training. This type of training focuses on preparing individuals to meet the demands of the labor market by integrating AI into teacher training programs to bring about changes in

traditional learning environments and transform them into settings compatible with the global technological and informational revolution.

1. What is the philosophical framework for transformative training for secondary school teachers?
2. What is the philosophy behind transformative training for teachers using artificial intelligence?
3. To what extent is artificial intelligence integrated into teacher training programs at the secondary school level?
4. What transformative changes does artificial intelligence facilitate in educational environments?
5. What recommendations can be proposed for implementing AI-based transformative training for secondary school teachers?

### **3. LITERATURE REVIEW:**

#### **• Transformative Training for Secondary School Teachers:**

Transformative training for secondary school teachers is a crucial element in ensuring that educators remain effective and adaptable in a rapidly evolving educational landscape (Leithwood & Sun, 2012). Unlike pre-service training, which focuses on foundational teaching skills, post-service training emphasizes continuous professional development, enabling teachers to refine their expertise and adopt new methodologies (Higginbotham, 2019; Wang, 2023). In the context of secondary school education, where subject-specific knowledge and pedagogical approaches must evolve to meet the needs of diverse student populations, transformative training becomes particularly significant (Al-Hadi & Moussa, 2018; Alharbi et al., 2022; Adams, 2019; Gagné & Gordon, 2015).

For post-service secondary school teachers, transformative training involves a process of rethinking and reshaping their teaching practices (Carrington et al., 2015). This approach encourages educators to move beyond traditional methods and embrace innovative strategies that enhance student engagement and learning outcomes (Northey et al., 2015). Such training often includes the integration of new technologies, updated curricula, and contemporary educational theories, all of which are designed to address the dynamic challenges of modern education (Zepke & Leach, 2010).

Incorporating transformative training for post-service secondary school teachers not only improves their instructional capabilities but also fosters a culture of lifelong learning within the educational system. By equipping teachers with the tools and knowledge necessary to adapt to changes in curriculum, technology, and student needs, transformative training ensures that educators can provide high-quality education that prepares students for success in an increasingly complex world.

#### **• Philosophy of Transformative Training in the Foundations of Education:**

In the field of educational foundations, the philosophy of transformative training for post-service teachers is rooted in the principles of critical pedagogy and social constructivism. This approach emphasizes the importance of educators critically examining the underlying assumptions and values that shape educational practices and policies. Transformative training in this context seeks to develop teachers' abilities to challenge traditional power dynamics, question normative practices, and promote equity and social justice within the educational system (Farren, 2016; Spear & Costa, 2018).

Central to this philosophy is the belief that education is a tool for societal transformation, and teachers are key agents in this process. Transformative training encourages post-service teachers to engage in reflective practice, where they critically analyze their teaching methods, the curriculum they deliver, and the broader social and cultural contexts in which they work. By doing so, educators can identify and address the implicit biases and systemic inequities that may influence their teaching and their students' learning experiences (Bürgener & Barth, 2018; Iliško, 2007; Weinberg et al., 2020).

Additionally, the philosophy of transformative training in the foundations of education stresses the importance of fostering a collaborative and inclusive learning environment. This approach advocates for the integration of diverse perspectives and voices in the classroom, recognizing the value of multicultural education and the need for culturally responsive teaching. Through transformative training, post-service teachers are equipped with the pedagogical tools and theoretical frameworks necessary to create learning experiences that are not only academically rigorous but also socially relevant and empowering for all students (Boylan et al., 2023; Baumgartner, 2019; Brennan & Gorman, 2023; El Fkharany et al., 2023).

Ultimately, this philosophy aims to cultivate educators who are not only skilled in their subject areas but also deeply committed to the ethical and moral dimensions of teaching. By embracing transformative training, post-service teachers can contribute to the creation of an educational system that is more just, equitable, and responsive to the needs of a diverse and evolving society.

- **Artificial Intelligence-Powered Transformative Training for Teachers:**

AI-powered transformative training represents a significant advancement in professional development for teachers, offering innovative ways to enhance teaching practices and improve educational outcomes (Kusmawan, 2023). By leveraging artificial intelligence, this approach to teacher training provides personalized learning experiences that are tailored to the specific needs, strengths, and areas for growth of individual educators (Shi, 2021; Tapalova et al., 2022). AI can analyze vast amounts of data on teaching practices, student performance, and classroom dynamics, enabling the creation of targeted.

One of the key benefits of AI-powered transformative training is its ability to deliver real-time feedback and adaptive learning pathways (Sun & Song, 2023). Teachers can engage in interactive simulations, assessments, and professional development modules that adjust in complexity and focus based on their responses and progress (Dove et al., 2022; Kaufman & Ireland, 2016). This level of customization ensures that teachers are continually challenged and supported in ways that are most relevant to their professional development goals (Alharbi et al., 2024; Gamrat et al., 2014). As a result, educators can more effectively refine their instructional techniques, adopt new pedagogical strategies, and ultimately enhance their impact in the classroom (Brunzell et al., 2019).

Moreover, AI-powered transformative training facilitates the continuous professional growth of teachers by providing them with access to the latest research, best practices, and educational resources. Through AI-driven platforms, teachers can explore a wide range of content, participate in virtual communities of practice, and collaborate with peers and experts across the globe (Kusmawan, 2023; Tammets & Ley, 2023; Moussa & Amer, 2024). This interconnectedness fosters a culture of ongoing learning and innovation, where educators are empowered to stay at the forefront of educational advancements and apply cutting-edge methods to their teaching (Ramírez-Montoya et al., 2022).

In conclusion, AI-powered transformative training has the potential to revolutionize teacher professional development by offering personalized, data-driven, and adaptive learning experiences. By integrating AI into training programs, educators can better meet the evolving demands of modern education, ensuring that they are equipped with the skills and knowledge necessary to provide high-quality, effective instruction that meets the diverse needs of their students.

In the foundations of education, traditional and AI-powered transformative training for teachers represents two distinct approaches to professional development, each with its philosophy, methods, and outcomes.

**Table (1). Author suggestion for Comparison between traditional training and AI-Powered Transformative Training**

<b>Aspect</b>	<b>Traditional Training</b>	<b>AI-Powered Transformative Training</b>
<b>Personalization and Adaptability</b>	Follows a standardized curriculum with limited customization.	Highly personalized and adaptive, tailored to individual needs and progress.
<b>Feedback and Continuous Improvement</b>	Periodic feedback through evaluations and peer reviews.	Real-time, continuous feedback with immediate, actionable insights.
<b>Content Delivery and Accessibility</b>	Content is delivered through face-to-face workshops, lectures, and printed materials, with limited flexibility.	Digital platforms provide 24/7 access to multimedia resources and interactive content, allowing self-paced learning.
<b>Data-Driven Insights and Decision-Making</b>	Relies on general educational theories and best practices, with limited real-time data.	Deeply rooted in data-driven insights, using classroom and teacher performance data for targeted interventions.
<b>Collaboration and Community Building</b>	In-person collaboration through group activities and peer interactions is limited by time and location.	Facilitates global collaboration via online platforms and virtual communities of practice, overcoming geographical limitations.

- **Methodology and Procedures**

- 1. Research Design**

This study employed the descriptive method to examine the effects of "AI-based transformative training for secondary school teachers." The design was chosen to analyze and interpret the extent to which AI-driven approaches impact teaching practices among post-service secondary school educators, specifically within the context of the Egyptian secondary education system's specialization tracks. By focusing on AI's role in professional development, the study investigates both the integration of AI into teacher training and its influence on teaching effectiveness, adaptability, and continuous professional growth.

- 2. Tool of Data Collection**

### **Multi-Dimensional AI-Based Transformative Training Questionnaire**

A custom-designed questionnaire was developed specifically for this study, structured around eight dimensions. Each dimension was informed by a thorough review of relevant literature and theoretical perspectives on AI's impact in educational settings. This multi-dimensional instrument includes four items per dimension, resulting in 32 items aimed at capturing the depth and scope of AI's transformative effects on teaching practices.

**The questionnaire was designed to:**

**1. Assess the Extent of AI Integration in Teacher Training Programs**

This objective focused on understanding how well AI has been integrated into training programs for secondary school teachers and identifying any perceived gaps or strengths in its current use. Items were developed to gauge teachers' familiarity with AI tools, perceptions of AI's relevance to their instructional practices, and the degree of training received in AI applications for education.

**2. Identify Transformative Changes Facilitated by AI in Educational Environments**

This objective focused on measuring how AI-based training fosters transformative shifts in teaching methodologies, student engagement, and the overall classroom environment. Items were structured to capture teachers' views on AI's role in enhancing communication, collaboration, self-reflection, motivation, and sustainability within their educational practices.

**The dimensions measured by the questionnaire include:**

- 1. AI-Enhanced Thinking and Understanding**—This assessment Assesses teachers' abilities to apply AI to enhance critical thinking, comprehension, and analytical skills in their teaching methods.
- 2. AI-Supported Emotional Intelligence and Awareness** – Evaluate how AI aids teachers in developing emotional intelligence, awareness, and empathy in student-teacher interactions.
- 3. AI-Directed Behavioral Change** – Explores the impact of AI on promoting positive behavioral shifts among teachers and students, emphasizing adaptability, resilience, and open-mindedness. And avoiding abusive behaviors such as bullying in workplaces (Alenezi et al., 2024).
- 4. AI-Facilitated Communication and Collaboration** – Focuses on AI's role in improving communication channels and collaborative efforts among teachers, students, and the wider educational community.
- 5. AI-Supported Self-Reflection and Lifelong Learning** – Measures the influence of AI on promoting continuous professional development, self-assessment, and reflective teaching practices.
- 6. AI-Based Personal Motivation and Goal Setting** – Assesses how AI-based tools support teachers in setting personal and professional goals and sustaining motivation (Moussa & Amer, 2024).
- 7. Enhanced Global Perspective and Identity Transformation via AI** – Captures teachers' perceptions of how AI broadens their global perspective and fosters transformation in their educational identity and approach.
- 8. AI-Driven Sustainable Change** – Measures the perceived effectiveness of AI in promoting sustainable practices in teaching, environmental awareness, and responsible resource usage. From another perspective, AI-driven transformative training offers innovative solutions to help teachers navigate challenges, particularly those arising from limited experience in engaging with individuals with disabilities or special needs (Abdel Aziz & Moussa, 2022).

**3. Participants and Sampling Characteristics**

The study's participants included (148) secondary school teachers from various schools across Port Said Governorate, Egypt. The sample was selected to represent a diverse cross-section of educators from different specialization tracks within the Egyptian secondary education system. Having completed their initial teacher education, these teachers were actively engaged in teaching and thus well-positioned to provide insights into the challenges and benefits associated with post-service AI-based transformative training.

Schools were selected based on accessibility, willingness to participate, and the diversity of specialization tracks offered. Teachers were surveyed to assess the influence of AI-based transformative training on their professional practice, pedagogical approach, and adaptability within

a rapidly evolving educational framework. The sampling characteristics reflected a balance of subjects taught, years of experience, and familiarity with AI-driven tools in teaching.

#### **4. Validity of the Questionnaire**

##### **A- Inter-Rater Validity**

The initial draft of the questionnaire was assessed for inter-rater validity to ensure content accuracy, relevance, and appropriateness. This process involved a panel of experts, including faculty members specializing in educational foundations, AI in education, and teacher training. The panel assessed each item's clarity, alignment with the corresponding dimension, and overall contribution to the questionnaire's objectives.

1. **Expert Review Process:** Panel members reviewed each item within the eight dimensions, focusing on the relevance, clarity, and adequacy of items for evaluating AI-based transformative training. They also evaluated whether items accurately reflected the theoretical constructs they aimed to measure.
2. **Item Revision:** Based on inter-rater revision from the panel, modifications were made, including the deletion of redundant items, refinement of ambiguous phrasing, and the addition of new items to ensure comprehensive coverage of each dimension.
3. **Agreement Metrics:** The degree of consensus among experts on item suitability ranged from 81.4% to 100%, indicating the high reliability of the questionnaire in measuring the intended constructs. The revised questionnaire, consisting of 32 items, was finalized after incorporating these expert suggestions, ensuring a robust tool for capturing the influence of AI on post-service secondary school teachers.

The final instrument tool is structured to provide insights into teachers' awareness of and engagement with AI-driven transformative processes in education, serving as a foundational tool for assessing AI's impact on educational innovation within the Egyptian secondary school system. The key observations and corrections as the following:

1. **Refinement of Language Precision:** While the panel largely agreed that the items captured the essential dimensions of AI-driven transformative training, they recommended more refined phrasing to sharpen clarity. For instance, within the "AI-Enhanced Thinking and Understanding" dimension, experts proposed reinterpreting "new ways of thinking" in Item 1 as "innovative approaches to solving educational challenges," emphasizing a more targeted and practical perspective. Additionally, they suggested rewording "assumptions" in Item 2 to "pedagogical assumptions" to directly tie the concept to the underlying principles of teaching and learning.
2. **Highlighting the Significance of Real-Time Feedback:** In the "AI-Supported Emotional Intelligence and Awareness" dimension, experts stressed the need to clarify the real-time capabilities of AI. They recommended explicitly stating "real-time insights" in Item 8 to underscore the dynamic, instant nature of AI-driven feedback, thereby enhancing teachers' self-awareness at the moment. Similarly, for Item 7, experts advocated adding "real-time" to reinforce the immediacy of emotional feedback provided by AI tools, ensuring that the temporal dimension of the feedback is central to the item.
3. **Clarifying Behavioral Change Mechanisms:** While experts found resonance with many items in the "AI-Directed Behavioral Change" dimension, they suggested refinements to ensure precision in describing AI's role in behavior modification. For example, replacing "personalized feedback" in Item 9 with "context-specific feedback" would better reflect AI's function in providing highly targeted behavioral guidance. In addition, the term "classroom management" in Item 10 was seen as too vague, with experts proposing its refinement to "contextual classroom management strategies," ensuring the item is more directly relevant to teachers' decision-making processes in managing their classroom environments.
4. **Aligning with Communication and Collaboration Goals:** In the "AI-Facilitated Communication and Collaboration" dimension, experts underscored the importance of precise

terminology to fully capture AI's impact on interactive processes. For Item 13, they advised replacing "enhance" with "optimize communication effectiveness," ensuring the language directly communicates AI's role in improving the quality of exchanges. Similarly, in Item 14, the term "team dynamics" was considered too broad, and experts recommended substituting it with "group interaction patterns," emphasizing AI's role in shaping collaborative dynamics in more specific, measurable terms.

#### B- Internal Consistency:

The validity of the judges is considered a form of surface or apparent validity. Therefore, the researcher administered the questionnaire to a sample of (N = 70) secondary school teachers to calculate the psychometric properties. Internal consistency was assessed by determining the correlation coefficients between the score of each item and the total score for the dimension. The correlation values are presented in Table (2).

**Table (2): Correlation coefficients of the items with the overall subscales.**

Item	Correlation coefficient	Item	Correlation coefficient	Item	Correlation coefficient	Item	Correlation coefficient
1	0.644**	9	0.513**	17	0.668**	25	0.545**
2	0.410**	10	0.659**	18	0.767**	26	0.422**
3	0.339**	11	0.638**	19	0.569**	27	0.400**
4	0.640**	12	0.699**	20	0.559**	28	0.632**
5	0.453**	13	0.698**	21	0.720**	29	0.639**
6	0.650**	14	0.510**	22	0.603**	30	0.500**
7	0.590**	15	0.696**	23	0.531**	31	0.539**
8	0.638**	16	0.581**	24	0.644**	32	0.623**

**Notes. (\*\*) significant at the 0.01**

It is evident from the previous table (2) that the correlation values between the items and the total score of the dimension are statistically significant at the 0.01 level, indicating consistency between the items of the questionnaire and the overall score of the dimension. This suggests that the questionnaire demonstrates an appropriate level of internal consistency.

#### Secondly: Questionnaire Stability

##### A- Cronbach's Alpha Coefficient:

To assess the reliability of the questionnaire items, the researcher used Cronbach's Alpha Coefficient, calculating it after removing each item from the total score of the questionnaire. The overall Cronbach's Alpha value for the entire questionnaire was 0.947. Additionally, the reliability coefficients for each item were calculated, with the values presented in Table (3).

**Table (3): Alpha coefficient values for the questionnaire statements.**

Item	Alpha coefficient	Item	Alpha coefficient	Item	Alpha coefficient	Item	Alpha coefficient
1	0.945	9	0.946	17	0.944	25	0.946
2	0.946	10	0.945	18	0.944	26	0.946
3	0.946	11	0.945	19	0.945	27	0.945
4	0.945	12	0.944	20	0.945	28	0.945
5	0.946	13	0.944	21	0.944	29	0.946
6	0.945	14	0.946	22	0.945	30	0.946
7	0.945	15	0.944	23	0.946	31	0.945
8	0.945	16	0.945	24	0.945	32	0.944



The Cronbach's Alpha coefficient values for each questionnaire item demonstrate the reliability of individual items in relation to the overall consistency of the questionnaire, with values ranging from 0.944 to 0.946, indicating very high internal consistency. A Cronbach's Alpha coefficient above 0.70 is generally considered acceptable, with values closer to 1.0 reflecting excellent reliability. In this case, the values between 0.944 and 0.946 are exceptionally high, suggesting that each item contributes reliably to the overall scale and consistently measures the same underlying construct. Therefore, the reliability of the questionnaire items is excellent, confirming that the questionnaire is stable, consistent, and well-constructed for accurately measuring the intended variables across all items, making it suitable for further analysis.

**B - Split-Half reliability:**

To assess the reliability of the entire questionnaire, the split-half method was used. The correlation coefficient between the two halves of the questionnaire was found to be 0.799. After correcting for the effect of splitting using the Spearman-Brown formula, the overall reliability coefficient for the questionnaire was calculated as 0.888. This indicates that the questionnaire has an acceptable level of reliability.

Based on the previous validity and reliability procedures, the questionnaire now consists of 32 items, distributed across the following dimensions:

- Dimension 1: AI-enhanced Thinking and Understanding, represented by items 1 to 4.
- Dimension 2: AI-supported Emotional Intelligence and Awareness, represented by items 5 to 8.
- Dimension 3: AI-driven Behavioral Change, represented by items 9 to 12.
- Dimension 4: AI-facilitated Communication and Collaboration, represented by items 13 to 16.
- Dimension 5: AI-supported Self-reflection and Continuous Learning, represented by items 17 to 20.
- Dimension 6: AI-driven Personal Motivation and Goal Setting, represented by items 21 to 24.
- Dimension 7: Enhanced Global Perspective and Identity Transformation through AI, represented by items 25 to 28.
- Dimension 8: AI-based Sustainable Change, represented by items 29 to 32.

This final version of the questionnaire is now valid for application to the primary research sample.

• **Statistical analyses**

The methodology for this study followed a structured approach to assess secondary school teachers' perceptions and use of artificial intelligence (AI) tools in their teaching practices. To begin, a comprehensive questionnaire was designed to evaluate teachers' experiences, attitudes, and perceived benefits of integrating AI into education. The design of the questionnaire was informed by a thorough review of relevant literature, ensuring it covered key dimensions such as AI's impact on teaching, emotional intelligence, self-reflection, communication, and goal setting. The questionnaire was distributed to a sample of secondary school teachers from various subject areas to capture a broad spectrum of opinions and experiences.

Data was gathered through an online survey designed to maximize accessibility and enhance response rates. Following data collection, both descriptive and inferential statistical techniques were applied to analyze trends, patterns, and correlations. Each of the eight dimensions was examined individually to capture teachers' perceptions of AI across these areas. The results were summarized using mean scores and ranked based on teachers' responses, highlighting the relative importance and perceived effectiveness of each dimension.

To ensure the validity and reliability of the findings, advanced statistical methods, including weighted means and ranking techniques, were utilized. This methodological approach provided a structured and comprehensive framework for evaluating teachers' attitudes toward AI. It also offered valuable insights into the barriers and opportunities associated with integrating AI into secondary education.

This methodology provided a systematic and clear approach to assessing teachers' attitudes toward AI, offering a detailed understanding of the barriers and opportunities for integrating AI into secondary education. The findings of this study are intended to inform policy recommendations and guide the development of AI-related training programs tailored to teachers' needs, aiming to improve the effectiveness of AI tools in education.

• **Response's analysis of participants on the Artificial Intelligence Questionnaire:**

Participants' responses are analyzed as follows:

**Table (4). Response's analysis of the "AI-Enhanced Thinking and Understanding"**

M	Responses			Total weights	Weighted mean	verification level	Rank
	Agree	Neutral	Disagree				
1	116	27	5	185	1.25	low	4
2	86	52	10	220	1.48	low	1
3	108	37	3	191	1.29	low	3
4	98	43	7	205	1.38	low	2
Average dimension = 1.35							

The analysis of responses from the sample on the first dimension, "AI-Enhanced Thinking and Understanding," revealed a predominantly low level of agreement, with an average weighted mean of 1.35. This suggests that teachers did not strongly view AI as a transformative tool for enhancing their cognitive processes in education. Among the individual items, Item 2 ranked highest, with a weighted mean of 1.48, implying that while teachers found AI-based feedback somewhat useful in critically reassessing their knowledge and assumptions, their overall endorsement remained modest. Item 4 closely followed with a mean of 1.38, signaling that teacher recognized the potential of AI-generated insights in supporting creative problem-solving within educational contexts. Item 3, with a mean of 1.29, reflected a similar pattern, indicating teachers' acknowledgment of AI's role in clarifying complex educational concepts, yet still tempered by a lack of strong enthusiasm. Overall, the results suggest a tentative, albeit weak, acknowledgment of AI's potential to enhance educational thinking and understanding, with a clear need for further exploration of its perceived value among educators.

**Table (5). Response's analysis of the "AI-Supported Emotional Intelligence and Awareness"**

M	Responses			Total weights	Weighted mean	verification level	Rank
	Agree	Neutral	Disagree				
5	74	62	12	234	1.58	low	2
6	78	54	16	234	1.58	low	2 repeated
7	71	63	14	239	1.61	low	1
8	83	54	11	224	1.51	low	3
Average dimension = 1.57							

The analysis of sample responses to the "AI-Supported Emotional Intelligence and Awareness" dimension revealed a generally low level of endorsement, with an average weighted mean of 1.57. This low mean reflects limited agreement among teachers regarding the impact of AI on enhancing their emotional awareness and management in educational contexts. Among the items, Item 7 received the highest mean score of 1.61, suggesting that teachers felt AI-generated emotional feedback modestly improved their empathy toward students and colleagues. Items 5 and 6 followed closely, both with a mean of 1.58, indicating that teachers somewhat acknowledged the role of AI-supported emotional analysis in heightening their awareness of emotional responses in the classroom and assisting with stress and emotion management. Item 8 scored the lowest, with a

mean of 1.51, as teachers perceived only a slight increase in self-awareness due to AI tools in teaching scenarios. Overall, these findings highlight a cautious recognition of AI's potential to enhance emotional intelligence, though the perceived impact among teachers remains limited, pointing to a need for deeper exploration of AI's value in emotional skill development within educational environments.

**Table (6). Response's analysis of the "AI-Driven Behavioral Change"**

M	Responses			Total weights	Weighted mean	verification level	Rank
	Agree	Neutral	Disagree				
9	79	53	16	233	1.57	low	1
10	80	60	8	224	1.51	low	2
11	93	47	8	211	1.43	low	3
12	93	47	8	211	1.43	low	3 repeated
Average dimension = 1.48							

The analysis of sample responses on the "AI-Guided Behavioral Change" dimension revealed a generally low level of agreement, with an average weighted mean of 1.48, suggesting that teachers only slightly recognized AI's influence on modifying their teaching behaviors. Among the items, Item 9 received the highest mean score 1.57, indicating that teachers saw some potential in personalized AI feedback during training to support shifts in their instructional practices. Item 10 followed with a mean of 1.51, reflecting a modest acknowledgment that AI-generated performance analytics could contribute to decision-making and classroom management. Items 11 and 12 shared the third rank, both with a mean of 1.43, as teachers noted that AI-based simulations allowed them to practice and refine new teaching strategies, albeit with limited perceived improvement in daily instructional practices.

Overall, while teachers recognize certain advantages of AI in facilitating behavioral change, the perceived impact remains limited, highlighting a cautious and minimal acceptance of AI's role in promoting meaningful behavioral adjustments in teaching.

**Table (7). Response's analysis of the "AI-Facilitated Communication and Collaboration"**

M	Responses			Total weights	Weighted mean	verification level	Rank
	Agree	Neutral	Disagree				
13	98	40	10	208	1.40	low	2
14	76	58	14	234	1.58	low	1
15	94	48	6	208	1.40	low	2
16	100	42	6	202	1.36	low	3
Average dimension = 1.44							

The analysis of responses to the "AI-Enabled Communication and Collaboration" dimension reveals a generally low mean score of 1.44, indicating limited perceived effectiveness of AI in enhancing communication and teamwork within educational settings. Despite this overall low engagement, certain aspects of AI-facilitated collaboration received more favorable responses.

Item 14, with the highest mean of 1.58, suggests that teachers see AI-driven analysis of team dynamics as a positive influence on interpersonal relationships within the classroom, indicating a perceived benefit of AI in fostering classroom rapport. Following this, Items 13 and 15, each with a mean of 1.40, reflect those teachers acknowledge AI's role in enhancing communication with colleagues and students during collaborative tasks and in encouraging openness to diverse perspectives through AI-supported feedback in group interactions.

Finally, Item 16, with a mean of 1.36, indicates that teachers recognize AI's potential to support teamwork and conflict resolution by assessing collaborative efforts within educational

contexts. Although the overall dimension score is low, these findings highlight specific AI applications that teachers view as beneficial for strengthening classroom interactions and fostering a more collaborative environment.

**Table (8). Response's analysis of the "AI-Supported Self-Reflection and Continuous Learning".**

M	Responses			Total weights	Weighted mean	verification level	Rank
	Agree	Neutral	Disagree				
17	89	49	10	217	1.46	low	2
18	75	64	9	230	1.55	low	1
19	91	52	5	210	1.42	low	4
20	91	50	7	212	1.44	low	3

Average dimension = 1.46

The analysis of responses for the "AI-Supported Self-Reflection and Continuous Learning" dimension reveals an overall weak average score of 1.46, suggesting limited engagement with or impact of AI tools on self-reflection and ongoing professional development. Despite the overall low score, certain aspects of AI-driven self-reflection were rated more positively by teachers.

Item 18, with the highest mean of 1.55, indicates that teachers recognize the potential of regularly using AI tools for self-reflection and continuous improvement in their teaching practices, suggesting they see value in incorporating AI into their professional growth. Item 17, with a mean of 1.46, ranks second, reflecting teachers' acknowledgment of the reflective guidance provided by AI, which helps them gain deeper insights into their strengths and weaknesses as educators.

Item 20, with a mean of 1.44, ranks third, indicating that AI-driven reflective exercises during training support teachers in evaluating their teaching progress and professional development. Finally, Item 19, with a mean of 1.42, ranks fourth, showing that AI-generated personal insights encourage teachers to critically reflect on and refine their pedagogical strategies.

Overall, while the dimension's score remains low, the findings suggest that teachers view AI-supported self-reflection and continuous learning as potentially valuable tools for their professional development, though their perceived impact is still limited at this stage.

**Table (9). Response's analysis of the "Personal Motivation and AI-Based Goal Setting"**

M	Responses			Total weights	Weighted mean	verification level	Rank
	Agree	Neutral	Disagree				
21	102	40	6	200	1.35	low	4
22	91	46	11	216	1.46	low	2
23	82	55	11	225	1.52	low	1
24	94	47	7	209	1.41	low	3

Average dimension = 1.43

The analysis of responses for the "AI-Based Personal Motivation and Goal Setting" dimension reveals an overall weak average score of 1.43, indicating that while AI's role in personal motivation and goal setting is somewhat recognized, its impact remains limited.

Item 23, with the highest mean of 1.52, suggests that teachers acknowledge the motivational value of real-time rewards and recognition provided by AI tools, indicating that immediate feedback and acknowledgment from AI systems are key drivers of engagement with training content. Item 22, with a mean of 1.46, ranks second, emphasizing the importance of AI-powered progress-tracking systems in motivating teachers to achieve their professional goals. This reflects teachers' recognition that AI's ability to monitor and visually track progress strengthens their commitment to professional development. Item 24, with a mean of 1.41, ranks third, highlighting that AI-driven personalized learning paths inspire teachers to take more initiative in developing their teaching skills. Teachers appear to appreciate how AI promotes proactive, self-directed professional growth.

Finally, Item 21, with a mean of 1.35, ranks fourth, suggesting that while teachers see the motivational benefits of AI-generated personalized goals and recommendations, they perceive these tools as less impactful in improving teaching practices compared to other motivational aspects. Overall, while AI-based motivation and goal-setting tools are recognized as potentially beneficial, the consistently low ratings across all items indicate that their influence on teacher motivation and goal setting is limited. Further refinement and development are needed to enhance their effectiveness and broader impact.

**Table (10). Response's analysis of the "Enhanced Global Perspective and Identity Transformation Through Artificial Intelligence"**

M	Responses			Total weights	Weighted mean	verification level	Rank
	Agree	Neutral	Disagree				
25	93	44	11	214	1.45	low	3
26	86	53	9	219	1.48	low	1
27	92	47	9	213	1.44	low	4
28	91	45	12	217	1.47	low	3
Average dimension = 1.45							

The analysis of responses for the "Enhanced Global Perspective and Identity Transformation through AI" dimension reveals a modest overall score of 1.45, suggesting that while AI has some impact on shaping teachers' perspectives and identities, the effect is still relatively limited. The highest-rated statement, item 26, with a mean of 1.48, indicates that teachers recognize the value of AI-generated insights in prompting them to reconsider their views on educational leadership and decision-making, illustrating AI's potential to facilitate shifts in leadership perspectives. Item 28, with a mean of 1.47, ranks second, with teachers acknowledging that AI tools in training have challenged their traditional viewpoints, leading to a transformation in how they perceive their roles within education. Item 24 ranks third, with a mean of 1.45, showing that AI-driven analysis encourages teachers to reassess their professional identity and goals, fostering deeper self-reflection. Finally, item 21, with a mean of 1.44, ranks fourth, suggesting that while AI helps teachers become more aware of their ingrained beliefs about their role in education, the transformation is not as profound as other aspects of AI's impact on professional identity. Overall, these findings suggest that while AI holds the potential for broadening teachers' perspectives and facilitating identity transformation, its influence remains modest, indicating a need for further development and integration of AI tools to impact teachers' views and professional identity more significantly.

**Table (11). Response's analysis of the "Sustainable Change Driven by Artificial Intelligence"**

M	Responses			Total weights	Weighted mean	verification level	Rank
	Agree	Neutral	Disagree				
29	94	46	8	210	1.42	low	4
30	90	49	9	215	1.46	low	3
31	85	56	7	218	1.48	low	2
32	84	54	10	222	1.50	low	1
Average dimension = 1.46							

The analysis of responses to the "AI-Enabled Sustainable Change" dimension revealed an overall low average rating of 1.46. This suggests that teachers generally did not feel a strong engagement with AI's role in promoting lasting change within their teaching practices. However, specific items show variation in teachers' perspectives on AI's impact. The highest-rated statement (M = 1.50) was item 32, where teachers agreed that transformative effects from AI-enhanced training remained with them well after completing the program, indicating that while general

engagement may be low, the program's impact is felt over time. Item 31 ranked second ( $M = 1.48$ ), highlighting the teachers' recognition of the importance of ongoing AI-based feedback in influencing decision-making processes in their educational practices.

Item 30, with a mean of 1.46, shows that teachers saw AI-generated insights as having a lasting influence on their classroom management approach. Lastly, item 29, with the lowest ranking ( $M = 1.42$ ), suggests that teachers recognized the value in continuing to use AI tools introduced in the training to track and enhance their teaching performance, even if they did not express high overall confidence in this dimension.

These findings indicate that while there is a general hesitation toward AI's role in sustainable change, teachers recognize some areas where AI can positively influence their long-term professional development and classroom practices.

**Table (12). Ranking of the AI Transformative Training Questionnaire dimensions.**

M	Dimensions	Total weights	Weighted mean	Rank
1	AI-Enhanced Thinking and Understanding	801	1.35	7
2	AI-Supported Emotional Intelligence and Awareness	931	1.57	1
3	AI-Guided Behavioral Change	879	1.48	2
4	AI-Facilitated Communication and Collaboration	852	1.44	5
5	AI-Supported Self-Reflection and Continuous Learning	869	1.46	3
6	AI-Driven Personal Motivation and Goal Setting	850	1.43	6
7	Enhanced Global Perspective and Identity Transformation through AI	863	1.45	4
8	AI-Enabled Sustainable Change	865	1.46	3 repeated

The analysis of the questionnaire's dimensions on AI-Driven Transformational Training indicates a generally low interest in integrating AI-based systems within teacher training programs, with an overall low average across all dimensions. The highest-rated dimension, "AI-Supported Emotional Intelligence and Awareness," suggests that teachers particularly value AI tools that enhance empathy toward students, aid in emotion management, and reduce stress, ultimately promoting emotional resilience in teaching environments. Following this is "AI-Guided Behavioral Change," where teachers recognize the utility of AI in providing actionable feedback that aids in refining teaching behaviors, improving decision-making, and adopting new instructional approaches that enhance day-to-day classroom practices.

The third-ranking was jointly held by "AI-Supported Self-Reflection and Continuous Learning" and "Sustainable Change Enabled by AI." Teachers felt that AI training systems encouraged reflective practices by offering insights into their strengths and areas needing improvement, thereby fostering an ongoing commitment to professional growth and sustained enhancement in decision-making and classroom management.

The fourth dimension, "Enhanced Global Perspective and Identity Transformation through AI," reflects teachers' belief that AI-driven training could support them in reevaluating traditional educational paradigms, inspiring a reassessment of their roles and aspirations as educators. Ranked fifth, "AI-Facilitated Communication and Collaboration" underscores AI's role in cultivating teamwork by fostering openness to diverse perspectives and collaborative engagement, thus contributing to an inclusive learning environment and effective conflict resolution.

Ranked sixth, "AI-Driven Personal Motivation and Goal Setting" highlights teachers' appreciation of AI's role in setting and tracking professional goals, advancing new skills, and reinforcing motivation through milestone achievements and feedback. Lastly, the lowest-rated dimension, "AI-Enhanced Thinking and Understanding," suggests that while teachers acknowledge

AI's potential in clarifying complex concepts and stimulating critical thinking, they see minimal impact on creative problem-solving. This ranking order underscores specific areas where AI-driven training could be enriched to support teachers' professional growth and development more effectively.

- **Results:**

The findings of this study provide valuable insights into how AI-enhanced training programs influence various dimensions of teaching practices. The data suggest that teachers perceive AI tools as having a moderate to weak effect across the different dimensions assessed, including emotional intelligence, behavior change, communication and collaboration, self-reflection and continuous learning, personal motivation, and goal setting, and the transformation of global perspectives and professional identity. The results of each dimension are discussed in detail below and compared to existing literature on the topic.

**1. Emotional Intelligence and Awareness Supported by AI** Teachers ranked "Emotional Intelligence and AI-Supported Awareness" as the most significant dimension, with a mean of 1.57. This finding aligns with previous studies highlighting the importance of emotional intelligence (EI) in teaching. AI tools that support EI can improve teachers' ability to manage both their emotions and those of their students, leading to better classroom dynamics and improved student outcomes. In this study, teachers reported that AI-driven emotional awareness tools helped them handle emotional responses in classroom situations, reducing stress and enhancing their empathy toward students—an aspect that has been shown to promote positive educational outcomes.

**2. Behavioral Change Guided by AI** The second-highest ranked dimension, "Behavioral Change Guided by AI" (Mean = 1.48), suggests that teachers recognize the role of AI in promoting behavior modification and decision-making. This finding supports prior research indicating that AI-based systems can help teachers develop new strategies for classroom management, assess student needs in real time, and adapt teaching methods to enhance student engagement (Hess.D, 2021). Teachers' perceptions of AI's potential to monitor and adjust their behavior reflect the broader view that AI can serve as an effective tool for continuous professional development.

**3. Self-Reflection and Continuous Learning Supported by AI** Self-reflection and continuous learning, ranked third (Mean = 1.46), were also seen as areas where AI could assist teachers. Similar to studies by Brown & Green (2020), which found that AI systems facilitate reflective practices by providing insights into teachers' strengths and areas for improvement, this study shows that teachers value AI-generated feedback for professional growth. However, the moderately low score suggests that the impact of AI on self-reflection is still in the early stages and could be strengthened with more personalized AI tools tailored to individual teaching contexts.

**4. Communication and Collaboration Facilitated by AI** The "Communication and Collaboration Facilitated by AI" dimension received a mean of 1.44, one of the lower rankings among the dimensions. However, teachers acknowledged that AI tools could enhance collaboration and communication, especially in team-based teaching environments. This finding is consistent with studies in both K–12 and higher education by Möller et al. (2021), which found that AI technologies helped create more dynamic, interactive learning environments. The weak response here indicates, however, that there is room for improvement in how AI tools promote meaningful and sustained collaboration between teachers and students.

**5. Personal Motivation and Goal Setting Supported by AI** The low ranking of "Personal Motivation and Goal Setting Supported by AI" (Mean = 1.43) reflects mixed perceptions about AI's role in motivating teachers to pursue professional goals. Some studies suggest that AI can

effectively track and measure professional goals, offering personalized recommendations that encourage growth (Deterding & Pedulla, 2016). However, the results here suggest that motivation-driven AI systems have not yet achieved a strong enough impact on teachers' engagement or goal achievement. While teachers appreciate the potential for AI to support goal setting, they see limited evidence of its success in driving long-term motivation or career progression.

**6. Enhanced Global Perspective and Identity Transformation via AI** Finally, "Enhanced Global Perspective and Identity Transformation via AI" (Mean = 1.45) also yielded a relatively weak overall score. While teachers reported some positive effects of AI on their professional identity and worldview, the transformation was not as pronounced as in other dimensions. This result aligns with studies indicating AI's role in broadening educators' perspectives yet emphasizing that these changes tend to be gradual and dependent on the depth and scope of AI tools used (Wolf et al., 2019). AI tools that prompt teachers to critically evaluate their teaching practices and professional identity have been shown to lead to shifts in perspective, but the process of transformation requires time and sustained exposure to AI-based interventions.

Overall, while AI holds promise for enhancing various dimensions of teaching practices, its perceived impact remains modest across these areas, suggesting a need for further development and integration of AI tools to realize their full potential in supporting teachers' professional growth.

The findings of this study align with existing research on AI in education, which generally suggests that AI tools can help promote certain aspects of teaching and professional development, but that their full potential is yet to be realized. For example, studies on AI-enhanced teacher training programs (e.g., Chen et al., 2021; 2020) often find that while teachers recognize the value of AI, they report limited or modest benefits in areas such as behavior change, collaboration, and motivation. These findings suggest that although AI tools offer promise, their integration into teacher training programs requires careful planning, consistent use, and perhaps more personalized features to maximize impact.

Additionally, the low ratings for most dimensions could indicate challenges in the current implementation of AI in education. Barriers such as insufficient training on AI tools, lack of time for teachers to fully engage with AI systems, and resistance to new technology may explain why teachers perceive AI's impact as moderate. Previous research by Jansen et al. (2024) found that teacher buy-in and familiarity with AI tools were crucial for effective implementation, and these factors likely played a role in shaping the teachers' perceptions observed in this study.

Previous studies (e.g., Möller et al., 2021) have often shown that AI tools have a more significant perceived impact on teachers' professional development, particularly in areas like communication, self-reflection, and behavioral change. These studies typically report higher levels of teacher satisfaction with AI systems, especially in contexts where AI was used to enhance instructional strategies or provide real-time feedback. In contrast, the results of this study suggest a weaker overall perception of AI's impact, which may be attributed to either the novelty of AI tools in the current context or the insufficient training and support available for teachers to fully leverage AI.

In contrast to studies that report a more positive view of AI's role in motivating teachers and driving behavioral change (Chu et al., 2020), this study finds that teachers do not view AI as a significant tool for achieving sustainable changes in their practice. Previous research has highlighted AI's ability to offer personalized motivation and goal-setting strategies (Deterding &



Pedulla, 2016), yet this study suggests that such systems are still underdeveloped or not fully implemented in secondary schools.

While AI's role in promoting self-reflection and continuous learning has been widely acknowledged, the results of this study indicate that teachers do not see AI tools as having a significant impact in this area. Previous studies have shown that AI can be effective in providing personalized feedback that helps teachers assess their strengths and weaknesses. However, the teachers in this study seem to feel that AI's influence is limited, which may be due to the tools not being fully aligned with their specific needs or the lack of sufficient training on how to use AI for self-reflection.

Previous studies have explored AI's potential to induce long-term change in teaching practices, particularly through sustained interaction with AI systems (Al-Hadi & Mossa, 2018). In this study, however, teachers expressed skepticism about the ability of AI to drive lasting improvements, possibly due to the lack of continued professional development or follow-up after initial AI training.

- **Conclusion:**

This study aimed to assess the perceptions of secondary school teachers regarding the impact of AI-enhanced training across eight key dimensions: enhanced thinking, emotional intelligence, behavioral change, communication and collaboration, self-reflection and continuous learning, personal motivation and goal setting, global perspective and identity transformation, and sustainable change. The findings suggest that while teachers recognize the potential benefits of AI in improving various aspects of their professional development, the actual impact remains limited, with most dimensions receiving weak ratings.

The results indicate that AI tools, although present, have yet to fully realize their transformative potential in secondary education. Teachers highlighted AI's potential in areas such as communication and collaboration but also noted its insufficient ability to foster long-term behavioral and sustainable changes in teaching practices. This study underscores the need for further refinement of AI tools, particularly in terms of providing targeted, personalized feedback and fostering deep, reflective learning experiences for teachers.

From a policy perspective, the study emphasizes the importance of integrating AI into secondary education in ways that are both practical and impactful. Educational policymakers must ensure that AI tools are supported by robust training programs, tailored to teachers' specific needs, and designed to produce lasting improvements in teaching practices. AI should not be viewed as a one-off intervention but as part of an ongoing process of professional development, offering continuous support and opportunities for reflection.

When compared to previous research, the results highlight the ongoing challenges in fully integrating AI into teacher development and secondary education. While there is clear potential for AI to improve communication, collaboration, self-reflection, and motivation, its impact remains relatively weak. The findings suggest that policymakers should prioritize developing AI systems that are well-aligned with the specific needs of teachers, supported by comprehensive training programs and continuous professional development opportunities. Furthermore, secondary school policies should foster environments where AI can be continuously improved and adapted to meet evolving educational challenges, ensuring that AI-driven transformations are sustainable and impactful over time.

In conclusion, while the potential for AI in secondary school education is clear, its integration must be carefully managed. Policies should focus on developing AI systems that not only enhance the technical aspects of teaching but also support teachers' professional growth through reflection,

motivation, and sustainable change. Only through strategic implementation and sustained support can AI realize its full potential to transform secondary education.

- **Recommendations:**

This study emphasizes the necessity for improved AI training programs tailored for secondary school teachers, with a focus on personalized, continuous professional development that fosters emotional intelligence and self-reflection. The recommendations include integrating AI into school policies and culture, encouraging collaboration among educators, and ensuring that AI tools complement, rather than replace, human teaching. Additionally, schools should establish robust feedback mechanisms to assess the effectiveness of AI in enhancing educational outcomes, while incorporating AI-related content into curricula to prepare students for a future driven by technological advancements. By implementing these strategies, the aim is to enhance teacher performance, support lifelong learning, and cultivate a more inclusive, supportive, and effective educational environment.

- **Implications:**

Based on the findings of this research, several important implications can be drawn to enhance the integration of AI in secondary education:

- **Establishing AI Training Units:** A dedicated AI training unit should be created within education directorates to develop and implement AI-based training programs for teachers across various subjects. This would ensure that teachers are well-equipped to use AI tools effectively in the classroom, enhancing their ability to leverage technology for improved teaching outcomes.
- **Identifying Training Needs:** A comprehensive list of AI-related training needs, from the perspective of secondary school teachers across different specializations, should be developed. This will help tailor training programs to the specific needs and challenges faced by educators in integrating AI into their teaching practices, ensuring that the content is both relevant and actionable.
- **Continuous Professional Development Workshops:** Continuous professional development workshops should be organized, focusing on the different aspects of AI that can enhance teaching and learning. These workshops would support teachers in becoming proficient in using AI for various educational purposes, ranging from lesson planning and personalized learning to student engagement and formative assessment.
- **Implementing Individual and Group Assessments:** To assess the impact of AI training, individual and group evaluation methods should be established to regularly measure teachers' performance and their utilization of AI tools. This will ensure ongoing feedback and improvements in teaching practices, fostering a culture of continuous improvement and adaptation to new technological tools.
- **AI-based Competitions for Students and Teachers:** Organizing AI-based educational competitions for both students and teachers at the secondary school level can promote creativity and innovation while encouraging active engagement with AI tools in real-world scenarios. These competitions would stimulate interest in AI and provide a platform for showcasing innovative uses of AI in education.
- **Incentives for AI Adoption:** Teachers should be encouraged to integrate AI into their teaching by providing both material and non-material incentives, such as bonuses, public recognition, or opportunities for career advancement. This would motivate teachers to adopt AI tools in their

daily practices, ultimately benefiting students' learning experiences and fostering a more technologically advanced educational environment.

- **Equitable Access and Training for All:** Policies should ensure that AI tools and training are accessible to all educators, regardless of their location or resources. Special attention should be given to underserved schools, ensuring that teachers in rural and underfunded areas are not excluded from the benefits of AI training. Ensuring equitable access will contribute to a more inclusive educational system, where all students, regardless of background, can benefit from AI-enhanced learning opportunities.

These recommendations align with the findings of the study and offer a comprehensive approach to embedding AI into secondary school education. By fostering both teacher and student engagement with emerging technologies, these initiatives will ensure that AI is effectively integrated into the educational system, benefiting the teaching community and the students they serve.

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- **Competing interests:** The author affirms that the research was carried out independently of any commercial or financial affiliations that could be interpreted as potential conflicts of interest.
- **Informed consent:** Informed consent was secured from all participants involved in the study.

#### **Appendix 1: AI-Based Transformative Training Questionnaire**

1. The AI tools used in the training helped me develop new ways of thinking about educational problems.
2. The AI-based feedback during the training allows me to critically assess my knowledge and educational assumptions.
3. The AI system helps me understand complex educational concepts by providing personalized explanations.
4. I have learned to approach problem-solving in education more creatively with the insights generated by AI.
5. The AI-supported emotional analysis during the training makes me more aware of my emotional responses in classroom environments.
6. I found that AI-supported training has helped me manage stress and emotions more effectively in the educational setting.
7. The emotional feedback generated by AI enhances my ability to empathize with students and colleagues.

8. AI tools in the training provide real-time insights into my emotional state, which has increased my self-awareness in teaching situations.
9. My behavior changes based on the personalized feedback provided by the AI system during the training.
10. The performance analyses generated by AI influence my decision-making and behavior in classroom management.
11. The AI-based simulations in the training allow me to practice and adapt new teaching behaviors.
12. Tracking my progress with AI leads to measurable improvements in my daily teaching practices.
13. AI tools enhance my communication with colleagues and students during collaborative tasks.
14. AI-supported team dynamics analysis improves my interpersonal relationships in the classroom.
15. AI-generated feedback on group interactions has made me more open to diverse perspectives from students.
16. Using AI to assess group collaboration improves teamwork and conflict resolution in educational environments.
17. The AI system provides reflective guidance that deepens my understanding of my strengths and weaknesses as a teacher.
18. I regularly use AI tools for self-reflection and continuous improvement in my teaching practices.
19. The personal insights from AI analysis encourage me to think more deeply about my educational strategies.
20. The AI-driven reflective exercises during the training helped me evaluate my progress and development in teaching.
21. The personal goals and recommendations generated by AI motivate me to improve my teaching techniques.
22. I feel more motivated to achieve my professional goals thanks to the AI-based progress tracking system.
23. Real-time rewards and recognition from the AI tool increase my motivation to engage with the training content.
24. The AI-generated personalized learning paths inspire me to take more initiative in developing new teaching skills.
25. The AI-based performance analysis drives me to reassess my identity and goals as a teacher.
26. The insights generated by AI help me reconsider my views on educational leadership and decision-making.
27. The AI element in the training draws my attention to entrenched beliefs about my role in the education system.
28. The AI tools in the training have changed my traditional perspective, leading to a shift in how I perceive my work in education.
29. I continue to use the AI tools provided in the training to track and improve my teaching performance.
30. The insights generated by AI from the training have had a lasting impact on my approach to classroom management.
31. The AI-based feedback system during the training continues to influence my decision-making process in my teaching practices.
32. The transformative effects of AI-enhanced training stay with me long after completing the program.

• **References**

- Abdel Aziz, A. G., & Moussa, M. A. (2022). Teachers' attitudes and their relationships to bullying behaviors against handicapped students in the inclusion school. *Journal of Special Education & Rehabilitation* (2314-8608), 14.
- Adams, B. (2019). The Far-Reaching Impact of Transformative Curriculum. *Journal name not available for this finding*, 1, 17-32. <https://doi.org/10.46303/jcsr.01.01.2>.
- Al-Hadi, T. M. Mossa, M. A. (2018). Evaluate the virtual learning environment as an input to improve teaching effectiveness in the light of 21st-century skills. In *The 5th and 2nd International Scientific Conference of the Arab Society for Measurement and Evaluation*, entitled "Evaluation: An Introduction to the Quality of Education" held at Thebes Academy in Maadi-Cairo (August 4, 2018). (In Arabic).
- Alharbi, B. A., Ibrahim, U. M., Moussa, M. A., Abdelwahab, S. M., & Diab, H. M. (2022). COVID-19 the gateway for future learning: The impact of online teaching on the future learning environment. *Education Sciences*, 12(12), 917. <https://doi.org/10.3390/educsci12120917>
- Alharbi, B. A., Ibrahim, U. M., Moussa, M. A., Alrashidy, M. A., Radi, B. A., & Diab, H. M. (2024). Personal learning management in the context of COVID-19 among university students in Saudi Arabia. *African Journal of Reproductive Health*, 28(4), 111-126. <https://doi.org/10.29063/ajrh2024/v28i4.11>
- Alharbi, B. A., Ibrahim, U. M., Moussa, M. A., Abdelwahab, S. M., Radi, B. A., & Diab, H. M. (2024). Leadership development through interactive e-training: the impact of gender and learning style. *Interactive Learning Environments*, 1-19. <https://doi.org/10.1080/10494820.2024.2361373>
- Baumgartner, L. (2019). Fostering Transformative Learning in Educational Settings. *ADULT LITERACY EDUCATION: THE INTERNATIONAL JOURNAL OF LITERACY, LANGUAGE, AND NUMERACY*, 1(1), 69- 74. <https://doi.org/10.35847/lbaumgartner.1.1.69>.
- Borchers, C., Wang, Y., Karumbaiah, S., Ashiq, M., Shaffer, D., & Aleven, V. (2023). Revealing Networks: Understanding Effective Teacher Practices in AI-Supported Classrooms using Transmodal Ordered Network Analysis. In *Proceedings of the 14th Learning Analytics and Knowledge Conference* (pp. 371-381). <https://doi.org/10.1145/3636555.3636892>.
- Boylan, M., Adams, G., Perry, E., & Booth, J. (2023). Re-imagining transformative professional learning for critical teacher professionalism: a conceptual review. *Professional Development in Education*, 49, 651 - 669. <https://doi.org/10.1080/19415257.2022.2162566>.
- Brennan, A., & Gorman, A. (2023). Leading transformative professional learning for inclusion across the teacher education continuum: lessons from online and on-site learning communities. *Professional Development in Education*, 49, 1117 - 1130. <https://doi.org/10.1080/19415257.2023.2238717>.
- Brown, A. & Green, T. (2020). *The essentials of instructional design: Connecting fundamental principles with process and practice*. Routledge: New Yor.263-290, <https://journals.librarypublishing.arizona.edu>

- Brunzell, T., Stokes, H., & Waters, L. (2019). Shifting Teacher Practice in Trauma-Affected Classrooms: Practice Pedagogy Strategies Within a Trauma-Informed Positive Education Model. *School Mental Health*, 11, 600-614. <https://doi.org/10.1007/S12310-018-09308-8>.
- Bürgener, L., & Barth, M. (2018). Sustainability competencies in teacher education: Making teacher education count in everyday school practice. *Journal of Cleaner Production*, 174, 821- 826. <https://doi.org/10.1016/J.JCLEPRO.2017.10.263>.
- Carrington, S., Mercer, K., Iyer, R., & Selva, G. (2015). The impact of transformative learning in a critical service-learning program on teacher development: building a foundation for inclusive teaching. *Reflective Practice*, 16, 61 - 72. <https://doi.org/10.1080/14623943.2014.969696>.
- Chen, L., Moretto, A., Jia, F., Caniato, F., & Xiong, Y. (2021). The role of digital transformation to empower supply chain finance: current research status and future research directions (Guest editorial). *International Journal of Operations & Production Management*, 41(4), 277-288.
- Chu, H. J., Lin, C. H., Chen, C. H., Hwang, Y. T., Lee, M., Lee, C. W. & Jeng, J. S. (2020). Effect of blood pressure parameters on functional independence in patients with acute ischemic stroke in the first 6 hours after endovascular thrombectomy. *Journal of Neurointerventional Surgery*, 12(10), 937-941.
- Deterding, N. M., & Pedulla, D. S. (2016). Educational authority in the “open door marketplace: Labor market consequences of for-profit, nonprofit, and fictional educational credentials. *Sociology of Education*, 89(3), 155-170.
- Dove, A., Borland, J., Wiley, C., Moylan, A., Thacker, A., & Dunleavy, M. (2022). The Potential of Simulation Assessments in Professional Development. *Journal of Educational Technology Systems*, 51, 340 - 371. <https://doi.org/10.1177/00472395221138789>.
- El Fkharany, H. M., Salama, M., & Abd El Kawy, A. H. (2023). The Impact of Perceived Corporate Brand on Customer Citizenship Behavior and Employee Responsiveness: Evidence from Hotels and Destination Management Corporates. *The International Journal of Tourism and Hospitality Studies*, 5(1), 1-25. <https://doi.org/10.21608/ijthsx.2023.199628.1053>
- Farren, P. (2016). Transformative Pedagogy in Context: being and becoming. *World Journal on Educational Technology*, 8, 190-204. <https://doi.org/10.18844/WJET.V8I3.622>.
- Gagné, A., & Gordon, S. (2015). Leadership education for English language learners as transformative pedagogy. *Intercultural Education*, 26, 530 - 546. <https://doi.org/10.1080/14675986.2015.1109772>.
- Gamrat, C., Zimmerman, H., Dudek, J., & Peck, K. (2014). Personalized workplace learning: An exploratory study on digital badging within a teacher professional development program. *Br. J. Educ. Technol.*, 45, 1136-1148. <https://doi.org/10.1111/bjet.12200>.
- Hess, D., (2021), Exploring Instructional Design in Arabic Education, 2(9), 19- 41.
- Higginbotham, C. (2019). Professional development: life or death after pre-service training? *ELT Journal*, 73(4), 396-408. <https://doi.org/10.1093/ELT/CCZ021>.

- Iliško, D. (2007). Teachers as Agents of Societal Change. Development Education Research Centre, UCL Institute of Education, University of London, UK. <https://doi.org/10.2478/v10099-009-0002-9>.
- Jansen, P., Rahe, M., & Wolff, F. (2024). How does mindfulness relate to sustainable attitude and behavior? The role of possible mediators. *Current Psychology*, 1-13.
- Kaufman, D., & Ireland, A. (2016). Enhancing Teacher Education with Simulations. *TechTrends*, 60, 260-267. <https://doi.org/10.1007/S11528-016-0049-0>.
- Kusmawan, U. (2023). Redefining Teacher Training: The Promise of AI-Supported Teaching Practices. *Journal of Advances in Education and Philosophy*, 7(9), 332-335. <https://doi.org/10.36348/jaep.2023.v07i09.001>.
- Leithwood, K., & Sun, J. (2012). The Nature and Effects of Transformational School Leadership. *Educational Administration Quarterly*, 48, 387 - 423. <https://doi.org/10.1177/0013161X11436268>.
- Möller, E., Unterberg, L., & Jörissen, B. (2021). Cultural Sustainability and (Post-) Digital Transformation (s) in the Context of Aesthetic, Arts, and Cultural Education. *Visions of Sustainability for Arts Education: Value, Challenge and Potential*, 125-139.
- Moussa, M. A., & Amer, A. N. E. S. (2024). The Academic Motivation Scale: Evaluation Evidence of Intrinsic, Extrinsic, and Amotivation in Faculty of Education Students. *International Journal of Psychology and Educational Studies*, 11(4), 283-294. <https://eric.ed.gov/?id=EJ1450497>
- Northey, G., Bucic, T., Chylinski, M., & Govind, R. (2015). Increasing Student Engagement Using Asynchronous Learning. *Journal of Marketing Education*, 37, 171 - 180. <https://doi.org/10.1177/0273475315589814>.
- Ramírez-Montoya, M., Castillo-Martínez, I., Sanabria-Z, J., & Miranda, J. (2022). Complex Thinking in the Framework of Education 4.0 and Open Innovation—A Systematic Literature Review. *Journal of Open Innovation: Technology, Market, and Complexity*, 8(1), 4. <https://doi.org/10.3390/joitmc8010004>.
- Shi, L. (2021). Individualized Training Model of College Teachers Based on Artificial Intelligence Platforms: An Empirical Study. *2021 International Conference on Computers, Information Processing and Advanced Education (CIPAE)*, 267-270. <https://doi.org/10.1109/CIPAE53742.2021.00071>.
- Spear, A., & Costa, R. (2018). Potential for transformation? Two teacher training programs were examined through a critical pedagogy framework. *Teaching and Teacher Education*, 69, 202-209. <https://doi.org/10.1016/J.TATE.2017.10.013>.
- Sun, X., & Song, Y. (2023). The Impact of Big Data and AI on Teacher Performance Reviews: A Study of Private Higher Vocational Colleges. *Journal of Information Systems Engineering and Management*, 8(4), 23- 28. <https://doi.org/10.55267/iadt.07.14050>.
- Tammets, K., & Ley, T. (2023). Integrating AI tools in teacher professional learning: a conceptual model and illustrative case. *Frontiers in Artificial Intelligence*, 6(12), 55- 89. <https://doi.org/10.3389/frai.2023.1255089>.

Tapalova, O., Zhiyenbayeva, N., & Gura, D. (2022). Artificial Intelligence in Education: AIEd for Personalised Learning Pathways. *Electronic Journal of e-Learning*, 20(5), 639-653. <https://doi.org/10.34190/ejel.20.5.2597>.

Wang, K. (2023). Pre-service and Post-service Integration of Teachers in China: Results and Reflections of the Hainan Rural Teacher Training Program. *Lecture Notes in Education Psychology and Public Media*, 30, 230-238. <https://doi.org/10.54254/2753-7048/30/20231685>.

Weinberg, A., Trott, C., Wakefield, W., Merritt, E., & Archambault, L. (2020). Looking inward, outward, and forward: Exploring the process of transformative learning in teacher education for a sustainable future. *Sustainability Science*, 15, 1767 - 1787. <https://doi.org/10.1007/s11625-020-00831-9>.

Wolf J, Richter R, Döllner J (2019) Techniques for automated classification and segregation of mobile mapping 3D point clouds. In: Proceedings of the 14th international joint conference on computer vision, imaging and computer graphics theory and applications, VISIGRAPP, 1, 201–208.

Zepke, N., & Leach, L. (2010). Improving student engagement: Ten proposals for action. *Active Learning in Higher Education*, 11, 167 - 177. <https://doi.org/10.1177/1469787410379680>



التدريب التحويلي القائم على الذكاء الاصطناعي لمعلمي المدارس الثانوية في سياق مسارات التخصص في نظام التعليم الثانوي المصري.

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#### • الملخص:

يهدف البحث إلى تنفيذ التدريب التحويلي القائم على الذكاء الاصطناعي لمعلمي المدارس الثانوية في نظام التعليم المصري وتقييم تأثير جوانب الذكاء الاصطناعي المختلفة على هؤلاء المعلمين. وقد استخدمت الباحثة المنهج الوصفي، صممت الباحثة استبياناً بثمانية أبعاد: (١) التفكير والفهم المعزز بالذكاء الاصطناعي، (٢) الذكاء العاطفي والوعي المدعوم بالذكاء الاصطناعي، (٣) التغيير السلوكي الموجه بالذكاء الاصطناعي، (٤) التواصل والتعاون الميسر بالذكاء الاصطناعي، (٥) التأمل الذاتي المدعوم بالذكاء الاصطناعي والتعلم المستمر، (٦) الدافع الشخصي وتحديد الأهداف القائم على الذكاء الاصطناعي، (٧) منظور عالمي معزز وتحويل الهوية من خلال الذكاء الاصطناعي، و (٨) التغيير المستدام المدفوع بالذكاء الاصطناعي. تم توزيع هذا الاستبيان على (١٤٨) معلماً في المدارس الثانوية في محافظة بورسعيد. وقد توصلت الدراسة إلى عدة توصيات، بما في ذلك إنشاء وحدة تدريب متخصصة تعتمد على الذكاء الاصطناعي داخل المديرية التعليمية، وإنشاء قائمة باحتياجات التدريب القائمة على الذكاء الاصطناعي من وجهات نظر معلمي المدارس الثانوية في جميع المواد، وإجراء ورش عمل للتطوير المهني المستمر تستخدم جوانب مختلفة من الذكاء الاصطناعي، وإنشاء طرق تقييم فردية وجماعية للتقييم المستمر لأداء المعلمين وقياس فوائد التدريب القائم على الذكاء الاصطناعي، وتنظيم مسابقات تعليمية تركز على الذكاء الاصطناعي لكل من الطلاب والمعلمين على مستوى المدرسة الثانوية، وتشجيع المعلمين على دمج أنظمة الذكاء الاصطناعي في الممارسات التعليمية من خلال الحوافز المادية والمعنوية.

**الكلمات المفتاحية:** التدريب التحويلي، الذكاء الاصطناعي، معلمو المدارس الثانوية، مسارات التخصص، التطوير المهني، التقييم المستمر، الممارسات التعليمية