



# Exploring the influence of artificial intelligence-enhanced online learning platforms on the development of teacher self-efficacy and academic achievement in contemporary digital learning contexts

Jyoti & Asha Yadav

## ABSTRACT

Introduction of Artificial Intelligence (AI) as a tool to be used in online learning platforms has transformed the digital education environment radically and impacted the teaching process, the engagement between the learners, and the success of the students significantly. This paper explores how AI-enhanced platforms can influence teacher self-efficacy, which in this paper is defined as confidence on the part of educator to plan, perform and evaluate their teaching task and how this impacts student academic performance in online learning environments. The theoretical basis of this study is the theorizing of Bandura (1997) of self-efficacy and the research of Tschannen-Moran and Hoy (2001) on teacher efficacy. The study is dedicated to the adaptive learning systems with suggested paths, real-time feedback, and artificial intelligence analytics that assist teachers with the practical data to act and make decisions, to customize the learning process and looking after the multiple virtual classes.

**Keywords:** *Artificial Intelligence, Digital Learning Environment, Competence, Learning Outcome.*

## Introduction

The quick growth of the digital technology, particularly, the Artificial Intelligence (AI), brought a change in the educational environment, resulting in the paradigmatic change of the modes of teaching and learning. Several current learning settings in the education field, especially the online learning systems, are increasingly dependent on AI technology, including machine learning algorithms, intelligent tutoring systems, natural language processing, and realtime analytics. Although a considerable number of studies have described how AI can be used to improve the learning outcomes of students, little has been even done concerning the effects that such online learning environments have on teachers themselves, particularly in terms of self- efficacy. According to

Bandura (1997), teacher self-efficacy is an individual belief held by a teacher regarding the ability to organize, plan, and participate in the instructive activities. Self-efficacy concerning AI-enhanced digital learning platforms is a major milestone towards determining the ability of a teacher to adjust to the constantly changing digital technology, operate in an online classroom, individualize the teaching process, and assess student learning.

With the shift in K-12 education systems in many countries to hybrid or completely online, teachers are expected to operate within the space of technologically mediated pedagogies. AI-enhanced platforms will offer teachers real-time student engagement, predictive performance analytics, automated grading and personalized content suggestions. These characteristics can help teachers to create a control over teaching and improve their practice in general. The opportunities and affordances of these innovations could eventually enhance the teacher self-efficacy through an actionable insight, remedy the high workload of the administration, and differentiate instruction (Holmes et al., 2021). Meanwhile, the relationship between the academic success and the application of AI is mediated by the self-belief and the ability of a teacher to apply facilitative technologies (Tschannen-Moran and Hoy, 2001). As such, it is opportune and significant to know how AI environments afford supports and affect teacher self-efficacy, self-beliefs and eventually instructional efficacy so as to offer a platform to support the emergence of responsive education technologies and professional learning.

Artificial intelligence-enhanced online learning platforms have emerged as an important part of contemporary digital learning contexts because they combine technology, data analytics, adaptive content, automated feedback, and learner-centred instructional support. In recent years, online learning has moved beyond simple video lectures and digital notes to more interactive and intelligent systems that can identify learners' needs, suggest personalised learning paths, monitor progress, and provide instant academic support. These platforms use artificial intelligence tools such as adaptive assessment, chatbots, learning analytics, recommendation systems, automated grading, and personalised feedback to make the teaching-learning process more flexible and effective. In the present educational environment, where digital learning has become a regular part of schools, colleges, and higher education institutions, artificial intelligence has created new possibilities for improving both teaching practices and student outcomes. It helps teachers understand the learning behaviour of students, identify weak areas, plan remedial instruction, and use digital resources more effectively. Thus, artificial intelligence-enhanced online learning platforms are not only changing the method of content delivery but also transforming the role of teachers from traditional information providers to facilitators, mentors, and digital learning guides.

The influence of these platforms becomes especially significant when studied in relation to teacher self-efficacy and academic achievement. Teacher self-efficacy refers to teachers' belief in their own ability to plan instruction, manage learning activities, motivate students, use technology, and improve students' academic performance. When teachers use artificial intelligence-supported online platforms, they may feel more confident because these systems provide useful data, teaching resources, automated support, and personalised learning insights. Such support can improve teachers' confidence in handling diverse learners, designing digital lessons, assessing student progress, and adopting innovative pedagogical strategies. At the same time, students may also benefit through individualised learning, timely feedback, interactive content, and better engagement, which may contribute to improved academic achievement. In contemporary digital learning contexts, the relationship between artificial intelligence-based learning platforms, teacher self-efficacy, and academic achievement is highly relevant because successful education now depends not only on access to technology but also on how effectively teachers and learners use it. Therefore, the present study seeks to explore how artificial intelligence-enhanced online learning platforms contribute to strengthening teacher self-efficacy and improving academic achievement in modern educational settings.

Moreover, artificial intelligence-enhanced online learning platforms support a more inclusive, responsive, and outcome-oriented learning environment by addressing the varied learning needs of students. In traditional classrooms, it is often difficult for teachers to provide individual attention to every learner due to differences in learning speed, academic ability, motivation, and access to resources. AI-based platforms help reduce this gap by offering personalised learning materials, continuous assessment, performance tracking, and immediate feedback. This enables teachers to make evidence-based instructional decisions and provide timely academic support to students who require additional help. As teachers become more familiar with these digital tools, their professional confidence, technological competence, and instructional effectiveness are likely to improve. Consequently, the integration of artificial intelligence in online learning can create a positive cycle where empowered teachers use technology more effectively, students receive better learning support, and academic achievement improves in contemporary digital education settings.

### **Literature review on the study**

The role of Artificial Intelligence (AI) in online learning has brought in new opportunities in enhancing the teaching practice and student achievement. Some of the current studies and case studies reflect on the scope of the influence of AI-based platforms on the instructional practices, teacher effectiveness and empowerment, and educational outcomes. In this review, I will outline six significant case studies that are taking these factors into consideration according to different circumstances and establishments across the globe.

The article by Chen et al. on the topic of the AI-based Smart Classrooms in secondary schools in China was longitudinal. The teachers received an Access to an AI-based Smart Classroom platform where they could receive facial recognition and emotion detection to receive real-time learning analytics and a controlled AI-based learning environment. Teachers also stated that the confidence level was high as the AI tools gave specific feedback regarding the level of engagement, cognitive and emotional states of students. The information visualization of the platform helped to make an adjustment of the approaches of the teachers in real-time. This instructional practice was in line with a change of instructional practices as these practices shifted towards a more referential form of instructional practice that was in line with the needs of students. The authors summarized that AI enhanced classroom management and resulted in better academic outcomes due to a more customized teaching process.

The authors of the study by Holmes et al. assessed the use of IBM Watson Education AI tools in numerous K-12 schools within the U.S. Teachers were utilizing Watson expectant learning course and cognitive tutor modules. Results of a survey reported that teachers who had undertaken AI-based scoping pedagogical training had statistically significant high self-efficacy and instructional confidence. They attributed part of their growth to the adaptive learning suggestions and automatic student testing that was integrated into the platform that lessened their workload and made their instruction more accurate.

In India, the national platform DIKSHA contained modules of AI, which were applied to monitor learning process and suggest adaptive content. Narayan et al. considered a sample of teachers in government schools who were on the improved platform. The authors showed that AI-assisted information retrieved quick gap detection in the subject knowledge of learners and personal lesson plans by teachers, and led to an improvement in instructional competence. Had there not been the issues with digital training and infrastructure, the immediate promise of the program of DIKSHA could have been absolutely fulfilled which emphasizes the relevance of situational preparedness to form efficacy.

AI-based intelligent tutoring systems were incorporated in teacher training modules in one of the teacher-training universities in Finland. The pre-service teachers were able to interact with the AI tutors simulating student interaction, learning in the classroom, and planning their lesson, but the participants demonstrated their observed improvement in their instructional planning and even the state of preparedness. The application of AI in the experiential learning framework was also directly associated with the increase in the self-efficacy of teachers, especially regarding the ability to teach diverse virtual classrooms.

United Arab Emirates - AI-supported Blended Learning in Higher Education (Al-Harbi et al., 2022).

## Theories interconnected with the AI-Driven online learning platform: an analysis

The pedagogical consequences of the AI-based online learning platforms cannot be comprehensively explained by applying it to a single theoretical approach in terms of educational psychology, instructional technology, and AI in education (AIED). To conduct this study, we summarize an interrelation of theories so that we could critically examine how an AI-enabled environment impact a teacher self-efficacy and academic achievement in an online learning environment.

### Self-efficacy and Social Cognitive Theory (Bandura, 1997)

This study is based on the theoretical premise of the Social Cognitive Theory of Bandura and, to be more precise, on its component of self-efficacy, i.e., the idea of the ability of an individual to carry out some specific action. Teacher self-efficacy in the educational setting has an influence on classroom management, choices in planning the instruction, and reactions to the student needs. The AI-assisted platforms influence the teacher self efficacy due to their ability to offer instructors actionable information that establish feedback loops and predictive analytics that make them feel more in control of, and thus own, the instruction. The automated grading tools, adaptive learning engines, etc. allow the instructor to have more time to mentor the student and less time doing office work, so the teacher feels more competent (Tschannen-Moran, 2001), and professionally confident.

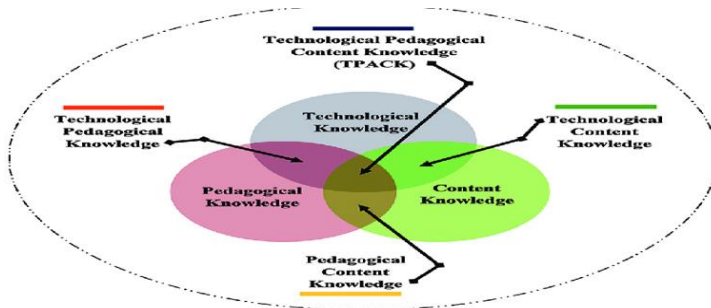


Source: <https://bandura-on-social-learning-theory-social-cognitive-theory/>

### Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006)

The TPACK model is critical to comprehending how educators utilize technology, pedagogy, and content knowledge together. Furthermore, AI-infused learning platforms will require new knowledge that surpasses minor digital literacy. Educators will need to match their pedagogical intentions with the affordances of AI-sponsored tools including intelligent tutoring systems, personalized user content delivery, and real-time performance reporting. Thus, pedagogical knowledge, content knowledge, and technological knowledge (AI

system) establish the teacher's ability to engage with the AI tools in relevant ways. There is a strong relationship between higher TPACK knowledge and higher self-efficacy beliefs to teach and better student outcomes when employing classes in a learning environment endowed with AI.



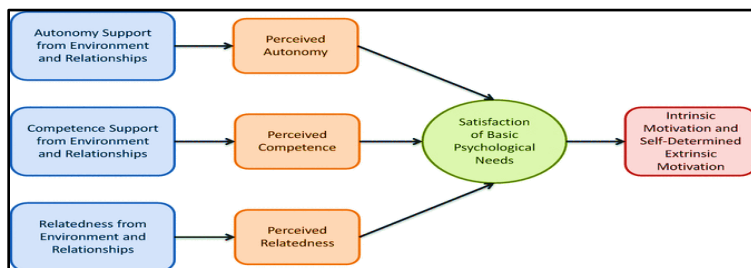
Source: [www.researchgate.net/TPACK-Mishra-Koehler-2006\\_fig1\\_353880981](http://www.researchgate.net/TPACK-Mishra-Koehler-2006_fig1_353880981)

### **Cognitive Load Theory (Sweller, 1988)**

AI can relieve extraneous cognitive load by automating mundane tasks and minimizing decision-making for educators. For example, dashboards informed by AI - the dashboard can show a summary of student learning gaps, suggest appropriate interventions, and then display data in visually intuitive ways. Educators can channel more cognitive engagement into crucial tasks such as critical thinking, lesson planning, and adaptive instruction. As cognitive load decreases, many teachers are more efficacious when managing the innumerable complexities prevalent in a blended or fully online environment.

### **Self- Determination Theory (Deci & Ryan, 1985)**

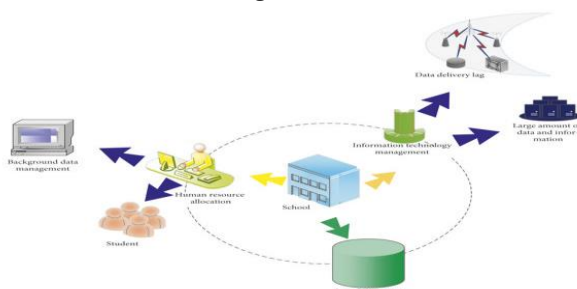
The theory of self-determination theorizes that motivation and psychological well-being derive from the satisfaction of three basic needs: autonomy, competence, and relatedness. An AI-focused platform could fulfill all three needs through the autonomy to decide (e.g. choose to accept or reject AI-based recommendations or make changes in learning paths) and opportunities to develop instructional competence through evidence-informed feedback and enhanced connectedness through communication tools and collaborative features. Once these needs are fulfilled, teacher motivation and self-efficacy flourish, and teachers adopt more effective instructional strategies and better academic outcomes.



Source: [www.barefootteflteacher.com/p/what-is-cognitive-load-theory](http://www.barefootteflteacher.com/p/what-is-cognitive-load-theory)

### Artificial Intelligence in Education (AIED) Instances (Luckin et al., 2016)

The AIED frameworks emphasize the human-in-the-loop philosophy of design which enables AI tools to situate an educational practitioner as augmented, rather than replaced. Within this context, AI is a smart companion or resource to assist in instruction like grading, content editing, or feedback. By learning the logic and structure according to AI recommendations, teachers will be able to work alongside and not separate AI in order to create inclusive learning environments. The augmented teacher efficacy is based on the reinforcement of human cognition and machine intelligence.



Source: <https://www.researchgate.net/figure/architecture-diagram>

A combination of these theories proves that AI platforms are prompting teacher development when placed into learning enabling pedagogical ecosystems. An enhanced sense of self-efficacy is not an accidental by-product of exposure to technology, and, above all, they will be an outcome of a meaningful involvement with technology features which will relate to the cognitive, motivational and pedagogical needs of the teacher. Under these interrelated theories, this paper builds its insights on how AI-integrated platforms respond to form identity as a teacher, professional capability and achievements to the students.

**The importance of the online learning platforms in the formation of the teacher self-efficacy and academic success in the contemporary circumstances of online learning.**

The global environment is moving towards online and blended education, and digital technologies are changing at an extremely high rate, signifying an alternative approach to education. This has seen us experience a rise in interest in the online learning platforms and their capabilities in terms of pedagogical and effective application to the teachers. Online learning systems are complexed, they can be described as simple online learning management systems which include (Moodle and Google classroom) to multimodal online learning systems that are incorporated with built in analytics. Instructional planning, content delivery, and interaction with students could be based on these systems. Currently most studies on successful students using digital environments give minimal attention to attitudes that impact teacher behaviour and self-efficacy (Bandura 1972). In education, our level of self-efficacy affects not only how we manage the classroom, but also the quality of our instructions and our ability to exploit the huge nature of the digital technology (Tschannen-Moran and Hoy, 2001).

To react to such a situation, this paper shall offer an analysis of the relationships around online learning systems and their role in supporting teacher self-efficacy and the role self-efficacy plays in shaping academic achievement in the new and digital learning platform. To be more precise, this study aims at making its contribution to the discussion concerning teacher empowerment in online learning, focusing on the experiences of the teachers, technology flexibility, and the ability of instructors to employ technology in their practice. The chosen research questions will give empirical information about whether online learning platforms can foster student learning outcomes and teacher agency, resiliency and possible future professional development.

### **Comparative insights**

The shift to the Internet-based learning system is already affecting the manner in which educators perceive themselves as able to teach, as well as learn, using technology, and how they grow professionally. Teacher-self-efficacy prior to the online learning platform was constructed largely in the ability of a teacher to provide a linear lesson in the classroom, whereby the classroom culture is based on the observation of peers and professional development. The teaching was typically textbook based and outlined at the margins of the teacher organization and assessment of the textbook content. Because of the lack of a hold of student engagement via the prism of an online platform, real-time data informed decision making was usually absent, and lacked access to on demand professional resources. Therefore, professional learning was based solely on the institutional training cycles, and formal professional learning opportunities with presentation and informal learning opportunities through cooperation with their colleagues inevitably postponed the opportunities of responsive approach in teaching and learning and innovation (Tschannen-Moran and Hoy, 2001).



On the other hand, integration supported an exhilarating transformation to a data informed teaching and learning culture, customized teaching and learning and professional learning in stark contrast to newly accessed educational platforms of the online learning (Holmes et al., 2021). Online learning environment and Learning Management System (LMS) is now accessible to teachers as a means of technological improvement of professional learning. Indicatively, numerous LMS facilitate instructors to deploy such websites as Google Classroom, Moodle, Microsoft Teams and Canvas or Edmodo that are powered by AI to mark tasks automatically. There is real time analytics, adaptive learning modules, and auto graded system which can offer some form of efficiency that gives teachers confidence in their ability to instruct. Better still, due to the instant feedback of how the students are responding to their teaching, the educator is able to adjust their teaching to achieve the learning goals without necessarily waiting to the set deadlines-enhancing their sense of control over the learning process and independence in the instructional situation (self-efficacy, Bandura, 1997). In each of the raised examples, October 2023, which is mentioned by (Holmes et al., 2021), the newly integrated technological advances in education systems and teaching practice, in some cases, predict an increase in self-directed professional learning by 300% through, e.g. teacher resource libraries, video tutorials working with a global community of peers using AI or distance feedback systems or communities of practice.

Professional development too has shifted institutional episodic sessions to embedded microlearning that is constant and tends to be individualized either through platform recommendations or through AI-generated suggested resources. It was customary among the teachers to wait until the external professionals provided some development related to digital skills, but nowadays, the teachers take the initiative to enroll in MOOCs, discussion boards, webinars, and LMS-based professional communities, just to mention a few. Regarding the figures of professional learning democratized to educators through platforms like the Coursera for Educators or the Microsoft Education Center, we can observe the development of educator agency and self-directed professional learning, especially young or mid-career teachers, who are more digitally competent, and self-directed learners. The other transformation area is in the self direction and trial of the teaching. In the past, pacing and design options of teachers were limited by physical resources and schedule of time. In the online environment, a teacher can now choose the rate at which learners advance through their learning process, design their own asynchronous learning courses, and implement some of the new pedagogies of the flipped classroom and project based learning. This has not only created a creative environment in pedagogy, but has also changed the attitude of learning towards more of a constructivist environment by focusing on themselves as facilitators rather than exclusive dispensers of knowledge. In this regard, it is worth mentioning that, according to Mishra and Koehler (2006), the shifts involve much interaction of pedagogy,

content and technology; a relationship where extends to greater self-efficacy of the teacher...

## **Conclusion**

Online learning environments have radically reformed the model of practice among stakeholders in the education sector by modifying the teacher role and the facilitative role of the student learning. As indicated by the current research, it is possible to utilize the use of online environments worked out in Ontario within the framework of the government initiative into the constituents of learning self-efficacy and academic achievement in teachers significantly. Applying theories of Bandura theory of self-efficacy and TPACK to the interpretation of data of the role of online environments utilized by the Ontario research under consideration as the framework of interpreting data, and as the means of implementing in the practice, the research will have a positive impact on the formation of teacher confidence in the teaching. The information observed that most of the teachers indicated that online environments helped them become more data driven and reflective in making decisions on their practices. The analysis of data revealed the visible development and transformation of the model of teaching, as being a model of resources with a very rigid learning environment to the one, which is more dynamic and learner-centered. Before the digital platforms came into play, the education developmental model was pegged on institutional direct formalized training and the aforementioned development that was based on experience alone. The teachers are now enjoying the advantages of a post access and re-of new working opportunities in an integration of digital access? One of the disruptive elements in the digital integration of capacity is the real time data, quasi-automated feedback, and collaborative and individualized instruction. This has greatly transformed the model of development opportunities, has enhanced perceived competency of teachers and a consequent decrease in their work, as the structures are integrated into the environmental contexts of online classroom, and has also affected the exploration of shared leadership and positive student success. However, the given findings also point at the fact that the positive effect of online learning platforms on teacher self-efficacy is conditional on a variety of factors: the equal access to technology, the well-organized professional development, the institutional support, and the innovative culture.

In conclusion, artificial intelligence-enhanced online learning platforms have become a powerful support system for improving both teaching effectiveness and students' academic outcomes in modern digital learning environments. These platforms strengthen teacher self-efficacy by providing data-based insights, personalised teaching support, automated assessment, and flexible learning resources. At the same time, they help students learn according to their own pace, receive immediate feedback, and remain more actively engaged in the

learning process. Therefore, the effective use of AI-supported online learning platforms can create a more confident teaching community and a more achievement-oriented learning environment, making them highly relevant for the future of education.

Overall, the study highlights that the integration of artificial intelligence in online learning is not merely a technological advancement, but an educational transformation. When AI-based platforms are used effectively, they can reduce learning gaps, support differentiated instruction, improve teacher confidence, and enhance students' academic performance. Hence, educational institutions should promote proper training, digital readiness, and ethical use of AI tools so that both teachers and learners can benefit meaningfully from contemporary digital learning systems.

## References

- Bandura, A. (1997). *Self-efficacy: the exercise of control*. W.H. Freeman and Company.
- Tschannen-Moran, M., & Hoy, A. W. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education*, 17(7), 783–805.
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017–1054.
- Trust, T., & Whalen, J. (2020). Should teachers be trained to use edtech? A systematic review of professional development in online learning. *Journal of Digital Learning in Teacher Education*, 36(4), 319–329.
- Holmes, W., Bialik, M., & Fadel, C. (2021). *Artificial Intelligence in Education: promises and Implications for Teaching and Learning*. Center for Curriculum Redesign.
- Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – where are the educators? *International Journal of Educational Technology in Higher Education*, 16(1), 1–27.
- Klassen, R. M., & Chiu, M. M. (2010). Effects on teachers' self-efficacy and job satisfaction: Teacher gender, years of experience, and job stress. *Journal of Educational Psychology*, 102(3), 741–756.
- Al-Harbi, S., Al-Fraihat, D., Joy, M., Sinclair, J., & Alrahmi, W. M. (2022). Investigating the impact of blended learning on academic performance and teacher efficacy in higher education. *Education and Information Technologies*, 27, 10901–10923.
- Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Intelligence unleashed: An argument for AI in education*. Pearson Education.
- Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). *Effective teacher professional development*. Learning Policy Institute.