Himachal Pradesh University Journal:
Humanities & Social Sciences
2025, Vol. 13, No. 2, 86-101
https://doi.org/10.64692/hpuj.v13i2.20

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. In fact, previous studies (e.g., Chen et al., 2020; Holmes et al., 2021) devoted their attention to how AI could be used to achieve teacher professional development, as well as help facilitate innovative pedagogies. Moreover, the study gives evidence that teacher efficacy when enhanced due to AI tools has a positive impact on student engagement, cognitive engagement, and performance (Kim and Jang, 2021). The proposed study will adopt a mixed-method design that will investigate the perceived and real effects of AI technologies on teacher confidence and competence to teach effectively in the digital world.

Keywords: *Artificial Intelligence, digital learning environment, competence, learning outcome.*

Jyoti, Research Scholar, Department of Education, Om Sterling Global University, Hisar.
Dr. Asha Yadav, Department of Education, Om Sterling Global University, Hisar.

1. 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.

The research aims to fill the knowledge gap regarding the subject matter by empirically investigating the impact of AI-driven online learning systems on the self-efficacy of teachers and the academic achievements

of students. The study will help to illuminate the digital changes in the educational field by analyzing (i) the relationships that a teacher develops with smart learning technologies, and (ii) the ways in which these relationships influence their professionalization and classroom performance. The results will also be used to advise those policy makers, education leaders, and those developing education technology, on the pertinent significance of teacher-focused AI design, and the attributes needed to produce teachers who are not only text-confident with technology, but also pedagogically empowered in their use of technology in the classroom.

2. 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. (2020) 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.

Holmes et al. (2021) 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 (Narayan et al., 2021).

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 (Salomaa and Laine, 2020).

Al-Harbi et al. (2022) compared AI-enhanced blended learning systems to Emirati universities. The elements of AI that were present in the studies were plagiarism detecting tools, adaptive quizzes, and learning analytics dashboards. The faculties showed confidence when it came to the teaching of online lectures through control of integrity issues. On the whole, it can be concluded that AI technologies offered more accountability to teachers, and they also facilitated student achievement, in particular, in connection with remote testing throughout the COVID-19 pandemic.

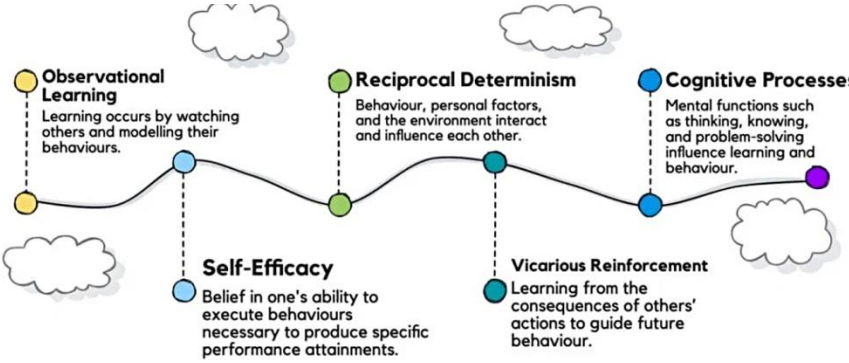
The UK EDUCATE programme assisted teachers with the help of AI tools that offered immediate feedback through AI in areas of their lesson delivery, how they employed engagement strategies, and the extent to which their students participated. The effect of the feedback plans gave the educators a chance to critically assess their practice as well as the ability to implement the results of the data. The qualitative interviews discovered that teachers were more self-assured and knowledgeable regarding pedagogy and this strengthened their self-efficacy. It is worth mentioning that the research observed ethical design of AI, and teacher freedom in the use of AI tools (Luckin et al., 2016).

3. Theories interconnected with the AI-driven online learning platform

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 impacts a teacher self-efficacy and academic achievement in an online learning environment.

Self-Efficacy and Social Cognitive Theory (Bandura, 1997)

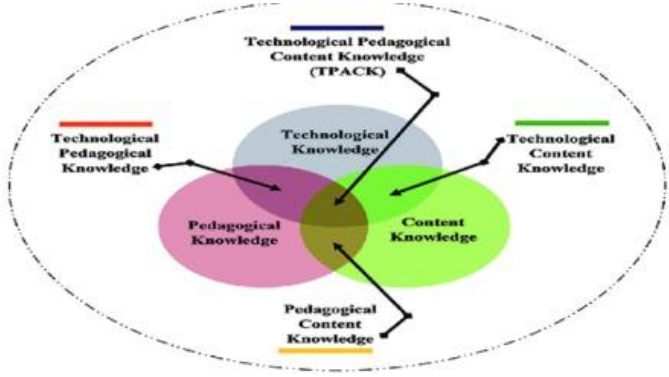
This study is based on the theoretical premise of the Social Cognitive Theory of Bandura and, to be more precise, on its component of self-efficacy, i.e., the idea of the ability of an individual to carry out some specific action. Teacher self-efficacy in the educational setting has an influence on classroom 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.



Cited by the web source: https://bandura-on-social-learning-theory-social-cognitive-theory/

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

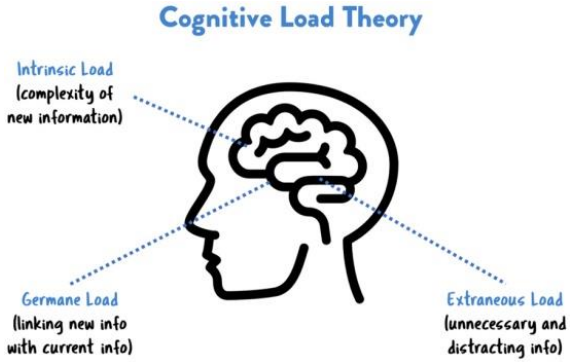
The TPACK model is critical to comprehending how educators utilize technology, pedagogy, and content knowledge together. Furthermore, AI-infused learning platforms will require new knowledge that surpasses minor digital literacy. Educators will need to match their pedagogical intentions with the affordances 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.



Cited by the web source: www.researchgate.net/TPACK-Mishra-Koehler-2006_fig1_353880981

Cognitive Load Theory (Sweller, 1988)

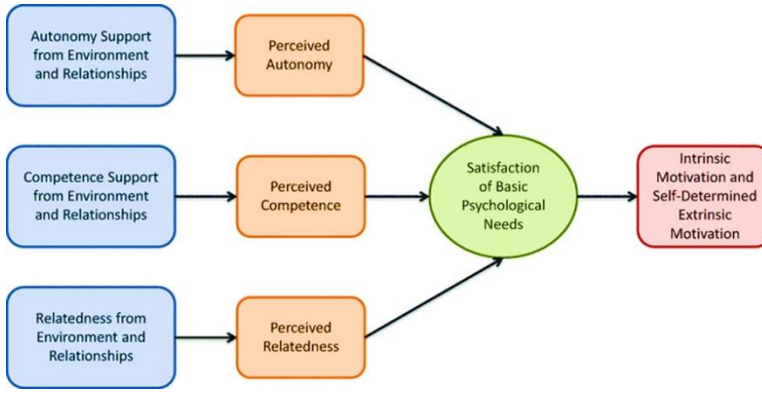
AI can relieve extraneous cognitive load by automating mundane tasks and minimizing decision-making for educators. For example, dashboards informed by AI - the dashboard can show a summary of student learning gaps, suggest appropriate interventions, and then display data in visually intuitive ways. Educators 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.



Cited by the web source: www.barefootteflteacher.com/p/what-is-cognitive-load-theory

Self- Determination Theory (Deci & Ryan, 1985)

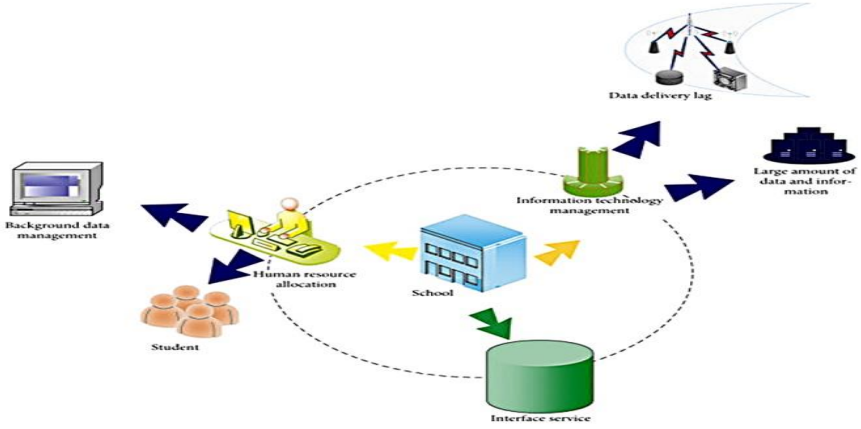
The theory of self-determination theorizes that motivation and psychological well-being derive from the satisfaction of three basic needs: autonomy, competence, and relatedness. An AI-focused platform could fulfill all three needs through the autonomy to decide (e.g. choose to accept or reject AI-based 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.



Cited by the web source: 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.



Cited by the web 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.

4. 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 1972In 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).

The features of online capability are automated testing, real-time assessment, self-directed learning, and collaborative features, and the said affordances may either strengthen the sense of self-efficacy - alternatively, they may also challenge it. The buttered bread TPACK (Mishra and Koehler, 2006) framework provides that as discussed in Chapter 1 enables the teacher to see the way forward by successfully using technology via content knowledge, pedagogical knowledge and technological knowledge. The teachers become relaxed in their exploration of the system and they tend to lean towards pedagogically - giving new methods a go - and consequently the students are engaged in

a meaningful way and the teachers succeed in their academic performance. Nevertheless, the study also demonstrates that unless teachers receive sufficient training on it, or not; the very presence of technology may increase the stress levels, lower the self-efficacy, and make students and teachers disengaged and unwilling to participate (Trust & Whalen, 2020). The understanding of this fact may complicate the problems of participation in digital learning opportunities, especially when the situation is already unequal in access to digital infrastructure and professional learning (Zawacki-Richter et al., 2019).

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.

5. Comparative issues: Before and after online learning, teaching self-efficacy and professional development.

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 ahold 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.

As qualitative research data taken after the pandemic suggests (Trust and Whalen, 2020; Al-Harbi et al., 2022), the previously reserved teachers changed their professional identities significantly. The mentioned educators claimed that their ability to provide differentiated instruction, consider various learning needs, and develop interesting digital resources increased significantly, which enhanced their self-esteem significantly. As one example, the previously purely lecturer-based approach to teaching had been replaced by the use of discussion boards, interactive quizzes, and visual analytics to assess comprehension and make adjustments. This not only gave these educators power but also developed a growth mindset which was aimed towards continuous digital learning. On the other side, the shift also revealed a digital divide: educators who did not have enough infrastructure or technology skills initially found the challenges to be quite early, which further proves the value of the fair access to technology tools and ongoing institutional support (Zawacki-Richter et al., 2019).

Professionally, the post-platform world has provided just-in-time training, flexible learning, and on-demand support compared to the traditional and inflexibility of the pre-digital capacity building methodologies. Whereas teachers used to be mere recipients of the training by the institutions and systems, they are now involved participants in their professional learning experiences. This has been further condensed through AI-guided suggestions and custom-created pedagogical materials on the proposed online platforms which can be applied on the particular teaching setting (Luckin et al., 2016). Thus, online learning platforms are currently enhancing academic performance that is indirectly optimised professional learning to self-efficacy of teachers and consequently, teachers were finally turned into reflective, information-driven and responsive professionals.

We have not simply shown a digital form of a classroom with the emergence of anchored online platforms, where we have also transformed the epistemology of teaching. Before online learning, teaching was more of a content-based approach and dominance of the teacher in delivering instructions where there are almost no constructs of immediate reflection or feedbacks on the part of the learners. In this scenario, the instructional choices of the teacher were based on the relied intuition, preconceived curriculum or the after-and-between tests to measure the learning results. It was also in these contexts that teacher self-efficacy after decades of experience was likely to remain stagnant and based on field-based displays of practice, as opposed to being based on cycles of feedback iteration. Moreover, classroom management besides being procedural, was also physical in nature, and it offered minimal chances of differentiating instruction or applying the concepts of universal designs (Darling-Hammond et al., 2005). With the introduction of online platforms, teachers are currently working in information-saturated real-time, and this can alter their decision-making protocols. The flows of information about students have enabled educators working in online space to be responsive to their student needs. Educators can review their planning, teaching and assessment within an elastic and adaptive learning ecosystem mediated by student trackable analytics- and modify their behaviors or approaches. The feedback mechanism can be immediate because the Khan Academy, Edmodo, or Schoology platforms can offer educators the immediacy of the information about who has accessed materials, how learners answered the questions asked, and what concepts should be reinforced. Feedback, which previously could only be presumed, and accepted by observation of traditional pedagogical methods, is relevant and it adds credibility to the perceived authenticity

of the teacher that provides to the sense of self-efficacy of the teacher (Klassen and Chiu, 2010).

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...

Nevertheless, the change is not free of problems. Online learning has brought about new sources of stress - technology breakdowns, information overload, information security fears, and boredom with learning software. They are all problems that indicate scaffolding that is due on an institutional level (reliable bandwidth, peer group that can support, and responsive help desk). Based on the findings of research (Trust & Whalen, 2020; Zawacki-Richter et al., 2019) in the absence of the scaffolding, regardless of how promising the platforms developed, teacher confidence and a vast majority of them resulted in techno-stress and stress-related burnout. However, in spite of the minor challenges,

studies have indicated that the net effect of online platform has been good - especially in areas where districts offered professional growth and leadership. The traditional teachers were no longer passive plan implementers, who began with prescribed curriculum, but became an independent instructional designer, as represented by the professionals who are able to ask themselves questions about their teaching based on student data. Essentially, the transformation of the more traditional learning context into the online learning context has brought about a new meaning to the concept of teacher identity, no longer the knowledge expert who delivers the content, but the role of mentoring and facilitating the learning as equals, strategists and learners to which technology is being applied in a manner that is yet to be reconciled with all elements of his or her teaching practice.

6. 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. Without these conditions, the adoption of technology is bound to increase the current differences and even transform, productively anxious working loads, into digitally troubled lives. Therefore, in order to achieve the promise of the online learning platforms of changing teaching and learning in a manner such that it leads to academic excellence, and empowerment of teachers, the usage of these technologies should also be pre-empted and accompanied by deliberate planning, policies that are inclusive, and models of sustained beginning teacher training and pedagogy, respectively. The results suggest that mindful use of online learning platforms may be critical leverage points that can be relevant in developing teacher self-efficacy and shaping academic performance. The educational systems will be able to create more flexible, contemporary, and trauma sensitive teaching workforce capable of responding more efficiently to the evolving needs of learners by using the technology which will help teachers improve their utilization of digital pedagogies.

References

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.

Bandura, A. (1997). *Self-efficacy: the exercise of control*. W. H. Freeman.

Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). *Effective teacher professional development*. Learning Policy Institute.

Holmes, W., Bialik, M., & Fadel, C. (2021). *Artificial intelligence in education: promises and implications for teaching and learning*. Center for Curriculum Redesign.

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.

Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Intelligence unleashed: an argument for AI in education*. Pearson Education.

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.

Tschannen-Moran, M., & Hoy, A. W. (2001). Teacher efficacy: capturing an elusive construct. *Teaching and Teacher Education, 17*(7), 783–805.

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.