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AI Usage in Education and Mitigation of Abilities: Collaboration, Communication, Critical Thinking and Creativity among University Students

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Abstract

Artificial Intelligence (AI) is becoming prominent in education, providing personalized learning, feedback, and administrative support. However, questions have been raised about the impact of this technology on the development of essential competencies such as collaboration, communication, critical thinking, and creativity among university students. Although AI can enhance teaching and engagement, it may also undermine human interaction and critical thinking skills. Emphasising the use of AI for writing, problem-solving, and idea generation can hinder students' development in these areas. To mitigate these effects, educators must find ways to balance the benefits of AI with traditional learning approaches. This study aims to explore the effects of AI on students' abilities related to the 4Cs. A quantitative research approach and descriptive design were adopted, using a questionnaire as the study's main tool. The study population was comprised of students from public sector universities across Punjab. And the random sampling technique was used to select the sample and it was consisted of 200 students from the different departments of Faculty of Social Sciences, University of Sargodha. The results indicated that AI usage in education was significantly reducing students' cognitive abilities. It was recommended that AI use should be carefully monitored to support students' cognitive development.

Keywords: Artificial Intelligence (AI), Collaborations, Communications Skills, Critical Thinking and Creativity

Introduction

Internet integrated artificial intelligence (AI) is now deeply rooted in all fields, and it impacts almost every sector, including education. Educational systems incorporation with AI is beneficial in regard to coming up with new ways of improving students, faculties, and administrative processes. AI-based tools are now being integrated as active tools for delivering courses, managing task, and offering feedback to students. Although there are many benefits of the use of AI in education, it has also abundant of drawbacks that need to be solved to ensure its appropriate application. According to AI's most valuable assets in education, it opens up personalized learning opportunities. Since there are several students in a class, the AI-driven platforms will enable to assess the learning patterns of each student to design each learning plan. However, Luckin et al. (2016) indicated that AI can assist in pacing of content delivery, and thus address the personalized nature of learning of a student. For instance, the cognitive tutor by Carnegie learning or even an AI tutoring system use machine learning to tutor the student and with the help of analysis of the respondent pattern (Chiu et al., 2023; Benedetto et al., 2019). It achieves this by allowing the students to concentrate on areas which they require more practice while permitting them to progress through sections in which they are strong at through their own rate hence increasing on the overall learning process.

Moreover, AI also helps to minimise the burdensome tasks in learning institutions and thus reduce the workload of instructors and other staff. One example of stepping up the use of it is automated grading system; which can help grade assignments, quizzes and examinations faster and more efficiently than before (Baker et al., 2019). This automation means that educators can focus on more complex activities that include coming up with the lessons to deliver as well as teaching the students individually. In addition, with AI, large data of institutions can be managed and students'

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performance can be predicted, at-risk students can be detected and timely interventions can be provided to them (Long & Siemens, 2011). For instance, predictive analytics can be useful in that it shows students that may be at risk of dropping out of the university. AI is also known to have the capability of improving student's participation through developing an engaging learning process. Teaching assistants anchored on virtual learning platforms as well as chat bots and intelligent games are useful in leveraging non-face-to-face learning (Fadel et al., 2019). Such as a teaching chat bot like "Jill Watson," created at Georgia Tech, provide FAQ responses to students in real time and thus relieve the instructors for more pertinent queries (Essel et al., 2022). This interaction allows students to receive quick response from the instructor, increases the level of classroom participation, and also increases the classroom engagement. Hence technology usage has positive impact on the academic achievement and the intellectual development (Hasan et al., 2024; Moldez et al., 2023).

Despite AI has a great potential for enhancing education, there are a lot of challenges and controversies linked to it. The most significant of them is security issues, and more specifically, protection of data collected from the users. AI systems in education depend on data that can drive improvements in learning and experiences resulting in significant concerns whether students' data are gathered, stored, utilized appropriately (Popenici & Kerr, 2017). Professionals and educational institutions have to amplify the utilization of AI systems only with the utter compliance of data protection legislation, and with due disclosing of the proposed data use. The other issue is that AI algorithms are not immune from bias. First, as any AI system is trained on data, then having biased data in the system leads to having the biased outcome, including discriminating against particular groups of students which it does not consider as valuable (Fadel et al., 2019). Hence, if the educational technologies are AI-driven then the problem of fairness and inclusiveness needs to be addressed appropriately.

However, owing to their usage, AI could lead to deterioration in the general problem-solving abilities of students. Salomon (2016) states that optimizing for answers through use of AI would mean people get less involved in learning. In this regard, teachers have to find means for integrating the opportunities offered by AI and motivating students to think through the material. Since the utilization of technologies in teaching and learning, Artificial Intelligence (AI) has transformed the education sector, providing new technologies/ solutions that aim at creating meaningful experiences to learners of all levels including university. AI is also known to have the capability of improving student's learning through virtual learning platforms, chat bots and intelligent games (Fadel et al., 2019).

Hence infusing AI in education is revolutionizing learning as well as embracing student uniqueness making work easier for institutions. However, there are emerging issues that the use of AI in learning may actually hamper the acquisition of essential student competencies including teamwork, expression, problem solving and innovation. Although AI tools make information more accessible and certain types of broad work easier but they limit the student's experience in critical problem solving, problem solving in a group, and creativity. As the use of AI created content and auto feedback might make the students rely more on the system and not self-learn as well as how to analyse or even communicate on their own. In addition, while the use of AI makes getting the answers easier, the learners may not engage in discussions or group works that help them deal with other viewpoints and embrace principle of engagement learning for improvement. Since university students are at a stage where these skills are so important it is relevant to look at how AI affects these competencies and to design ways of dealing with the possible negatives that may arise from it. Solving this problem will establish how instructors can foster the strengths of AI and guarantee students the interpersonal and cognitive abilities needed for a world characterized by artificial intelligence. This study is significant as it addresses the dual impact of Artificial Intelligence (AI) on university education that AI provides tools that make learning more accessible and efficient while there is evidence that AI and technology may be detrimental to the development of successful interpersonal skills including collaboration, communication, critical thinking, and creativity among students. These skills are important in the learning institutions and the rest of the student's life and for the right causes to prepare for other difficult settings. From the perspective of the role of AI towards the development of these competencies, this study is able to provide an appreciation of the manner in which a form of technology enhances students' development portfolio beyond thinking skills.

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Literature Review of the Study

The use of AI in education is disrupting the conventional roles of teaching and learning and enabling timely delivery and assessment, delivering tailored teaching and learning, and optimising resource usage. But also AI has invigorative social concerns such as stifling skills with an acute value in the professional and interaction environments such as collaboration, communication, critical thinking, and creativity (Bond et al., 2024). These skills are examined in this literature review in relation to the roles that AI may play in enhancing learning tools and contextually analysing how the abilities of learners in the University may be aided or hampered by educational AI.

AI and Collaboration

Collaborative learning being one of the benefits of AI technologies are frequently applied to create conditions for such learning. Like in Intelligent Tutoring Systems (ITS), group-problem solving and adaptive feedback can be promoted to enrich the group problem-solving process effectively (Liu et al., 2017). But it was also found that students who rely heavily on these tools are expected to have limited interactions with their classmates in other activities. Some challenges that Karimi & Khawaja (2023) identified were that while AI helps in collaborative tasks through providing options it hampers free flow of ideas in group, for instance students depend more on the AI- generated options rather than proposing what they think would be appropriate. In the same regard, Holmes and Tuomi (2022) opine that while the implementation of AI-driven platforms help students to interact and foster teamwork for ideal locations for student team projects, they might lead to a decrease in interpersonal communication as students tend to with each other. It becomes more worse by characteristics of the AI-driven platforms that although encourage effectiveness, may downplay the two-shed negotiations inherent in team environments (Luckin et al., 2016). The implications of these findings are that in educational settings, while there is potential for application of AI, the optimum conservative estimate of such application is that it complements interpersonal interactions since collaboration skills are relevant for career practice and advanced problem-solving pursuits.

AI and Communication Skills

Communication is imperative so far as academic and profession is concerned and it is quite crucial to determine as to how far AI has been playing its part regarding communication skills either positively or negatively. Language and communication skills play a substantial role in developing a healthy and peaceful learning environment (Nasreen et al., 2023). Research has highlighted both benefits and drawbacks such as the intelligent tools that offer a template or machine-generated response may complement students' technical communication by increasing the speed at which it is performed (Liu et al., 2017). However, such automation may have the downside that the students lose the chance to shape their individual communicative skills. Similarly, Marzuki et al. (2023) observed that students who used forms of AI enabled writing improved on aspects of grammar and syntax while still coming up with quite shallow arguments, a sign that such students were increasingly becoming reliant on AI in order to guide them.

Other research by Bond et al. (2024) also shows that although AI-supported communication tools provide continuous information exchange, they do not enhance the depth of understanding that effective classic, more mentally engaging, communication techniques can offer. Therefore, a risk exists that with its help, AI is able to support communication-related tasks, it may hamper developing skills like argumentation and or empathic listening. Educational approaches toward AI should therefore be based upon efficiency of AI as well as inclusion of activities, which support verbal and written interactions between students which would make various kinds of communication skills to develop more consistently.

AI and Critical Thinking

Another area which has seen remarkable involvement of AI and in which the role of the latter has been the subject of massive debates is critical thinking. It is a value that forms the basis of advanced learning institutions. In particular, AI is helpful at dealing with numbers and constructing substitutes for reasoning, so it helps in some parts of critical thinking. However, Holmes and Tuomi (2022) opined on the downside of using AI in that normally available solutions demotivate students to premeditate on the available analytical approaches. That is, convenience and efficiency of AI-supported solutions can suppress students' real understanding of complicated and unstructured problems, which is important for the development of their critical thinking abilities (Karimi & Khawaja, 2023).

There are many demands for designing AI that supports active rather than passive learning approaches in the literature. For instance, Liu et al. (2017) noted that the utilization of AI should lead to presenting questions that create deeper thinking or present differing viewpoints. The idea is to use AI as a tool that helps to provide the framework for students, with no a priori downloading the answer into the system and making the student just apply it, but allows students understand and analyse the problem and form the solution on their own. However this approach shows that when properly applied, AI can enhance critical thinking by means of presenting different options and their possible consequences, thus provoking critical thinking of each option on the part of the student.

AI and Creativity

A creative approach to learning enables concepts to be discovered, the creativity in the magnificent concept to be seen, and distinctive solutions to be formulated. With relevance to creativity, AI is likely to enhance the opportunities for tackling creation and generation of content by offering heuristic schemata of unconventional forms. Marzuki et al. (2023) explain that with the help of popular AI like visual or text-based creating tools, students are able to express their ideas and get the evaluation as soon as possible. But the problem crops up when students start to delegate their creativity and innovation to the AI applications in an unwholesome manner.

Based on the research of Luckin et al. (2016), with the technological support of AI, creativity can be enhanced in some prescribed tasks. On the other hand, students' autonomy to generate ideas will be restricted when AI proposes specific solutions for them. Holmes and Tuomi (2022) also take the same thinking in the aspect of conveying creativity; educational AI that should create and not dictate how students should draw their ideas so as to meet one set solution. Creative skills are essential and significant for the further work conditions, where innovation is critical, and thus, AI has to be useful in the way that fosters, not hinders inventive efforts.

Balancing AI and Skill Development

Both the development of intelligence and skills as well as the counterbalancing of AI to continue the growth of other general and specific job skills is a critical concern. Since AI is a multi-faceted tool impacting the development of students, a proper integration of the tool requires appropriate moderation to consider the minimum set of skills necessary for students. According to Karimi and Khawaja (2023), AI should be incorporated with conventional skills and development practices like group work and practical assignments. Merging the AI education approach supports the students to embrace AI as an assistant tool rather than as a training facilitator. In the same way, Bond et al. (2024) provided recommendations for how AI that instruct students should incorporate flexibility to students' individual learning capacity and how guidance should direct students to interact with content in striving for knowledge actively and collectively. Parents, guardians, and child caregivers too bear a significant responsibility in the balancing act but educational institutions and instructors have particularly a critical balance to perform. Based upon this, Luckin et al. (2016) propose interventions led by teachers that entail periodic and critical evaluation of the form, frequency, and purpose of references to AI in students' learning process by students themselves. Education should be designed on how to use and incorporate AI without being over-dependent on it. It should also be emphasized on how AI is supposed to enhance other human soft skills that cannot be mimicked by machines including empathy, creativity and ethics. While there are positive effects of AI implementation on higher education learners in the enhancement of specific skills besides offering learning opportunities in an innovative way, the contrary is also true. That is why, although AI serves as a tool to improve accessibility and effectiveness for students, if integrated improperly it can become a threat to students' development in those areas. However, for real collaboration, communication, critical thinking and creative skills to coexist with AI, educators need to find a good balance and ensure that students are very much active. Universities are urged also to set policies and working protocol regarding AI to promote the balanced education that will prepare students and help them become successful figures in an environment with AI implemented intensively.
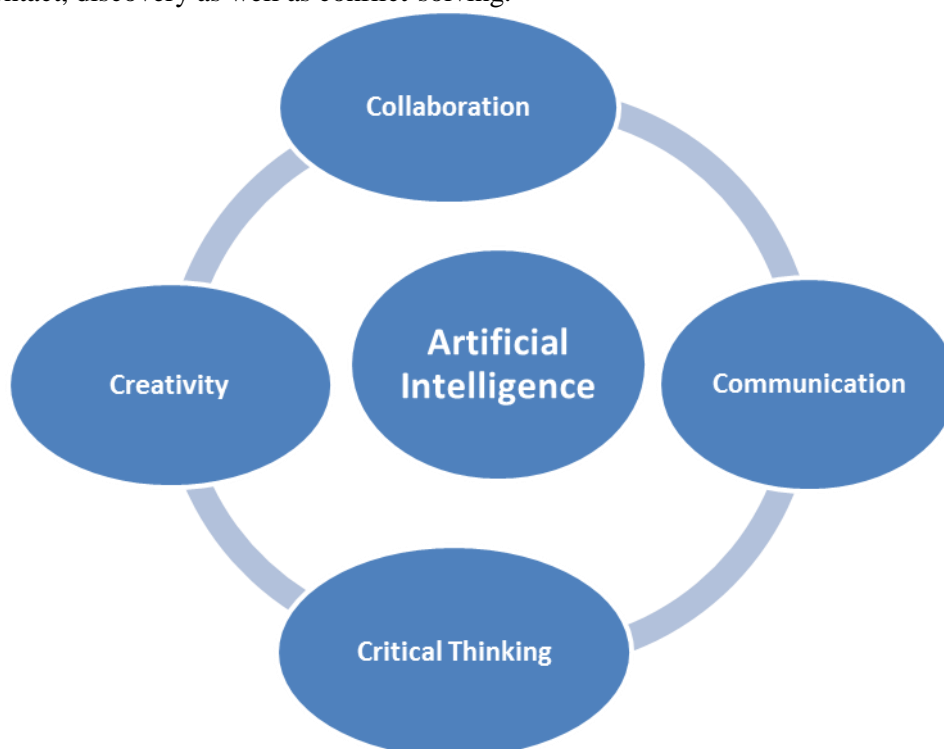
Theoretical Framework

The current study was grounded in the social constructivism theory and the experiential learning theory which are useful in getting an understanding of a typical evolving higher learning student's skills in relation to artificial intelligence usage. Social Constructivism was proposed by Vygotsky. One such theory being proposed is the theory on learning as a social activity where knowledge construction is a social process. Indeed, social constructivism is largely useful when it comes to

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realizing how the use of AI may be revolutionary or beneficial to the learning instructions and students' cooperatives and mutual communication. Finally we could state a few potential problems of over reliance on the presented AI tools. If students' use of these tools relies on interaction options provided by the tools too much then they may have few opportunities to develop interpersonal skills. But it also has the ability to increase collaboration through assistance with group projects and research which should improve teamwork and communication when done properly. While the Experiential Learning Theory was proposed by Kolb. According to this theory, learning takes place when one is absorbed in activities, pay attention to his or her activities and when he or she influences the activities in some ways. It helps in the development of critical thinking and creativity because in experiential learning the last step is experimenting which involves reflecting as well as problem solving. These incorporated active learning experiences may decline if over dependent solutions are AI-generated solutions cutting their potential for sharpening critical and creativity skills. Nevertheless, the application of advanced AI as a tool designed to increase the students' opportunities to engage in specific activities such as using an interactive simulation can improve cognitive and vicarious learning experiences.

Conceptual framework

The nature of AI adoption in education and its effects on student competencies such as collaboration, communication, critical thinking, and creativity are founded on the foundational-cantered or tech-mediated model for knowledge acquisition. AI is presented as enabler of learning with elements of differentiation, tailored suggestions made by these technologies as well as effective instructional materials dissemination. Nevertheless, questions are raised whether students have to rely mainly on AI source which may in fact revert on impairing important cognitive and social skills.

The framework categorizes AI's role in education into two domains i.e learning improvement which is individualised based on the student'/s learner's data and learning loss which involves reduced human contact and cognitive flexibility. Social skills are important in this case, they include; cooperation, information sharing, analysis and innovative abilities which are in most occasions as a result of contact, discovery as well as conflict-solving.

However, mitigating the skills to combat the problem of skill degradation, the use of AI needs to be incorporated in strategies that promote learning participation, students' interaction, and peer mentoring. By ensuring that such an agenda will augment recent educational practices instead of displacing them, the above-said framework helps maintain a balance whereby AI boosts learning but protects the kind of skills captured by the above acronyms.

Research Methodology

This research employs a quantitative approach to assess the effectiveness of the use of artificial intelligence in enhancing cooperation, information sharing and problem-solving abilities and creativity among the university students. The quantitative approach is suitable for this research because it enables a structured determination of pattern and trends that can help establish how the level of integration of AI is related to these necessary skills. This study thus adopts a cross-sectional survey design for gathering data from a large number of university students across disciplines. The study population was comprised of students from public sector universities across Punjab. And the random sampling technique was used to select the sample and it was consisted of 200 students from the different departments of Faculty of Social Sciences, University of Sargodha. The main instrument for primary data collection involves a structured questionnaire that captures the extent of AI utilisation among students, and the perceived effects of such tools on collaboration, communication, critical thinking, and creativity among students in their learning context. The five-point Likert scale was used to determine the frequency with which the students use the AI tools.

Data Analysis

T-Test for Gender Differences

To determine if there is a significant difference between male and female university students in terms of AI usage in education and its impact on abilities.

T-Test Results:

Variable	Gender	M	SD	t	df	P
Collaboration	Male	3.56	0.89	2.13	198	.034*
	Female	3.89	0.85			
Communication	Male	3.34	0.92	-1.65	198	.102
	Female	3.51	0.87			
Critical Thinking	Male	3.42	0.84	2.78	198	.006**
	Female	3.72	0.79			
Creativity	Male	3.49	0.78	-0.98	198	.329
	Female	3.56	0.81			

(*p < .05; **p < .01)

The t-test results showed a significant gender difference for collaboration ($p = .034$) and critical thinking ($p = .006$). Female students scored higher on both abilities compared to male students. There were no significant gender differences in communication and creativity.

Multiple Regression Analysis

To understand how AI usage impacts collaboration, communication, critical thinking, and creativity as predictive variables of each student's performance and development.

Multiple Regression Results AI usage and 4Cs

Variables	B	SE B	β	t	P
AI Usage (predictor)	0.45	0.11	.38	4.09	.001**
Gender (M/F)	0.13	0.09	.12	1.44	.152
Collaboration	0.33	0.08	.29	4.13	.003*
Communication	0.29	0.10	.24	2.87	.005*
Critical Thinking	0.51	0.19	.56	4.67	.112
Creativity	0.41	0.21	.38	1.91	.159

(*p < .05; **p < .01)

The regression analysis indicated that AI usage significantly predicts collaboration ($\beta = .29$, $p < .001$), communication ($\beta = .24$, $p = .005$), and critical thinking ($\beta = .36$, $p < .001$), suggesting that higher AI usage is associated with greater development in these areas. Creativity did not show a statistically significant relationship with AI usage ($p = .059$), though it approached significance. Gender was not a significant predictor in the regression model.

A t-test analysis was conducted to examine gender differences in the influence of AI usage on collaboration, communication, critical thinking, and creativity among university students. Results indicated significant gender differences in collaboration, $t(198) = 2.13$, $p = .034$, and critical thinking, $t(198) = 2.78$, $p = .006$, where females scored higher than males. A multiple regression

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analysis further revealed that AI usage is a significant predictor of collaboration (β = .29, p < .001), communication (β = .24, p = .005), while AI usage in Education was not a significant predictor in critical thinking (β = .56, p < .001) and Creativity (β = .38, p < .001). These findings reflected that the relevance of AI integration in supporting essential skills such as Collaborations and communication while mitigating abilities regarding critical thinking and creativity among university students.

Discussion

The current study was aimed to investigate the impact of this technology on the development of essential competencies such as collaboration, communication, critical thinking, and creativity among university students. The results of this paper showed that there is a positive correlation between the use of AI in education and the improvement of student skills including collaboration, communication, critical thinking, and creativity. On one hand, advocates of introducing AI into students' learning process claim that AI tools improve these abilities by providing learners with individual learning paths and by supporting skill development which is impossible in conventional instruction (Liu et al., 2017). For instance, the learning platforms based on the concept of adaptive learning are aimed at individual learning needs by stimulating deeper levels of engagement with the obtained learning material as well as encouraging critical thinking by problem solving activities (Bond et al., 2024). Through the use of AI, it is also possible to bring together employees including students in virtual classrooms and provide feedback to their works in real time as well as assist in the organization of group-related assignments (Karimi & Khawaja, 2023).

However, sceptics argue that AI may actually suppress such skills because the students are likely to rely on the technology as the main tool of acquiring the skills hence may lose the want to be actively involved in the process. Such as Holmes and Tuomi (2022) claim that automated AI tools which offer straightforward answers fail to promote students' activity which otherwise occurs in traditional learning environments and encourages critical thinking. At the same time, Marzuki et al. (2023) also noted that AI's communication assistance might reduce the actual communication skills and empathetic expression of students as the feedback provided would always be regular templates. These results imply that, whereas AI is capable of promoting learning, it has to be implemented cautiously in order to facilitate the consistent refinement of elemental human abilities for interaction and thinking. From the given outcomes it is clear that AI-enhanced learning is a balanced concept which means that even though beneficial sources should be integrated into learning the process, their objective is to complement and not to replace crucial human interactions (Luckin et al., 2016). For AI to be beneficial, teachers need to develop programs and learning experiences that are educative, challenging, and worthwhile.

Conclusion

The current study shed the light on both the possibility and difficulties of using AI in higher education. Learned technologies enable students to have a unique opportunity to achieve better organization of their academic activities with collaboration, communication, and creation. For instance, AI based platforms may enhance learning through fostering collaborative learning formed of barriers in virtual or diverse teamwork and communication. Also it is noteworthy that AI has the capacity to increase students' creativity and actually challenge their logical processes through individual methods of learning, generate new ideas and approaches of problem solving.

It was also found that the significant gender differences exited regarding the influence of AI usage on the collaboration and critical thinking while no significant gender differences were found in regard to communication and creativity.

Moreover, it was also found that AI usage significantly predicts collaboration, communication and critical thinking, suggesting that higher AI usage is associated with greater development in these areas. Creativity did not show a statistically significant relationship with AI usage, though it approached significance. Gender was not a significant predictor in the regression model.

These findings reflected that the relevance of AI integration in supporting essential skills such as Collaborations and communication while mitigating abilities regarding critical thinking and creativity among university students.

However, the study also revealed that the users should be aware of the negative aspect of AI usage. This is because if students rely on it as a tool which replaces their own reasoning capabilities. To avoid this, educators have to come up with a balanced use of AI policy and standards to assure that

AI is a complement to human skills and not a substitute. AI when effectively incorporated can be a helpful aid in facilitating work in groups, sharing ideas, critical and analytical thinking together with boosting students' creativity. Educational institutions should aim at developing rules and programs for integration of advanced artificial intelligence, while at the same time find ways that the learners can enhance these critical skills separately. However, to cater this challenge, a right proportion should be taken to ensure that AI is adopted as a complementary technique that complements human skill. Hereby institutions and educators should also stress critical thinking, solving, creativity, interpersonal skills while incorporating AI into the educational system. That is why universities can help AI complement human skills, not replace them, and prepare students for the future workplace, where AI tools are integrated into every aspect of work. Finally, only when AI is welcomed to the university responsibly and with purpose, such institutions can equip its student with the tools and skills relevant for the 21st century with the strengths of both humanism and AI.

Recommendations for future research

In light of the results of the current study regarding the use of AI in education and the effects it has on learners in their foundational skills of collaboration, communication, critical thinking, and innovation, some recommendations were made which are given as below.

It is recommended that use the AI where it can complement the process of students' interaction rather than replace it. The writing tasks should also be approached so that AI is involved in the organizing work of the project, for instance, in setting tasks or sorting documents.

It is also recommended that in order to sharpen the intellectual abilities such as collaboration, communication, critical thinking and creativity, the teachers should create project based learning tasks with AI employed as a tool for data collection. Students should analyse in their own way the obtained results provided by an AI tool, draw conclusions, and explain them with the help of written work or group discussions. This might reinforce the capability to analyse and think independently, so vital for real critical thinking.

It is also recommended that encourage students to use AI for enriching their creativity. Projects should demand that students mention some additional plusses including their ideas to these AI-generated outputs. This way they ensure that artificial intelligence support creativity without dominating their creative and innovative ideas that learners present in their projects.

It is also recommended that the policies should be devised introducing the idea of ethical use of AI in education. It should also make the student aware of what AI can do and what it cannot do, and cultivate positive attitudes for a sustainable human development that relates well with AI facilitating positive change and avoidance of misuse.

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