AI Practices in Lebanese Secondary Schools: Opportunities and Threats on the Teacher-Learner Relationship

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Abstract

The advent of artificial intelligence (AI) is causing a major upheaval in education. While some studies examined the advantages of AI in education, a more thorough grasp is required to successfully integrate this technology in classrooms. This research investigates the impact of AI implementation in Lebanese secondary schools and its effect on the teacher - learner relationship. It aims to explore the current perceptions and practices in the implementation of AI as well as the opportunities and threats posed on the teacher-learner relationship. A mixed-methods research design was implemented, blending quantitative surveys and qualitative semi-structured interviews. The survey assessed perceptions toward AI's impact on the teacher-learner relationship. 173 students and 73 high school teachers responded. Results showed that the majority of teachers and students claimed that AI will not replace teachers. However, more than 50% of teachers and students agreed that AI will lead to weaker relationships between teachers and students but cannot replace a teacher's ability to provide emotional support. Semi-structured interviews with a selected group of participants explored in-depth experiences, providing nuanced insights into how AI influences teacher-learner interactions. Qualitative results showed that AI gives more space for teachers to do extra work, however, AI won't be sensitive to the unique needs and contexts of individual learners.

Keywords

AI practices, teacher-learner relationship, Lebanese secondary schools, educators' and students' perceptions

Résumé

L'avènement de l'intelligence artificielle (IA) provoque une perturbation majeure dans le domaine de l'éducation. Alors que certaines études ont examiné les avantages de l'IA dans l'éducation, une compréhension plus approfondie est nécessaire pour intégrer avec succès cette technologie dans les salles de classe. Cette recherche examine l'impact de la mise en œuvre de l'IA dans les lycées libanais et son effet sur la relation enseignant-apprenant. Elle vise à explorer les perceptions et pratiques actuelles dans la mise en œuvre de l'IA ainsi que les opportunités et menaces sur la relation enseignant-apprenant. Un design de recherche à méthodes mixtes a été mis en œuvre, mêlant des enquêtes quantitatives et des entretiens qualitatifs semi-structurés. L'enquête a évalué les perceptions de l'impact de l'IA sur la relation enseignant-apprenant. 173 élèves et 73 enseignants du lycée ont répondu. Les résultats ont montré que la majorité des enseignants et des élèves ont affirmé que l'IA ne remplacera pas les enseignants. Cependant, plus de 50 % des enseignants et des élèves ont convenu que l'IA entraînera des relations plus faibles entre les enseignants et les élèves, mais ne pourra pas remplacer la capacité d'un enseignant à fournir un soutien émotionnel. Des entretiens semi-structurés avec un groupe sélectionné de participants ont exploré en profondeur les expériences, fournissant des informations nuancées sur la manière dont l'IA influence les interactions enseignant-apprenant. Les résultats qualitatifs ont montré que l'IA donne plus d'espace aux enseignants pour effectuer un travail supplémentaire, cependant, l'IA ne sera pas sensible aux besoins uniques et aux contextes des apprenants individuels.

Mots-clés

Pratiques de l'IA, relations enseignant-apprenant, lycées libanais, écoles secondaires libanaises, perceptions des éducateurs et des élèves

مستخلص

يسبّب ظهور الذكاء الاصطناعي ثورة كبيرة في التعليم. رغم قيام بعض الدراسات بفحص مزايا الذكاء الاصطناعي في التعليم، إلا أنّ تكامل هذه التقنية يستوجب دراسة أكثر شمولية لنجاحها في الفصول الدراسية. تهدف هذه الدراسة إلى استكشاف تأثير تنفيذ الذكاء الاصطناعي في المدارس الثانوية اللبنانية وتأثيره على العلاقة بين المعلّم والمتعلم. وتهدف أيضًا إلى استكشاف الانطباعات والممارسات الحالية في تنفيذ الذكاء الاصطناعي وكذلك الفرص والتهديدات التي يشكلها على علاقة المعلم والمتعلم. تم تنفيذ تصميم بحث مختلط الأساليب، يمزج بين الدراسات الكمية والمقابلات النوعية. قامت الدراسة بتقييم الانطباعات تجاه تأثير الذكاء الاصطناعي على العلاقة بين المعلّم والمتعلم، وقد استجاب 173 طالبًا و73 معلمًا. أظهرت النتائج أن غالبية المعلّمين والطلاب اعتبروا أنّ الذكاء الاصطناعي لن يحلّ مكان المعلمين. ومع ذلك، أكثر من 50٪ من المعلمين والطلاب توافقوا على أنه سيؤدي إلى علاقات أضعف بين المعلمين والطلاب ولكن لا يمكن أن يحلّ مكان قدرة المعلم على تقديم الدعم العاطفي. وافقت مقابلات مع مجموعة مختارة من المشاركين على اكتشاف تجارب عميقة، وتوفير رؤى دقيقة حول كيفية تأثيره الذكاء الاصطناعي على تفاعلات المعلم والمتعلم. أظهرت النتائج النوعية أن الذكاء الاصطناعي يمنح المزيد من المساحة للمعلمين للقيام بعمل إضافي، ومع ذلك، لن يكون حساسًا لاحتياجات المتعلّمين الفريدة.

الكلمات المفتاحية

ممارسات الذكاء الاصطناعي، علاقات المعلم والمتعلم، مدارس لبنان الثانوية، تصورات المعلمين والطلاب

1. Introduction

Computing systems that are capable of human-like tasks, such as learning, adapting, synthesizing, self-correcting, and using data for complicated processing tasks, are referred to as artificial intelligence (AI) systems (Popenici & Kerr, 2017). By using intelligent tutoring systems, intelligent agents, and intelligent collaborative learning systems, AI can support and improve learning environments in the field of education (Salas-Pilco et al., 2022). Recently, the education sector has been significantly influenced by AI research (Salas-Pilco & Yang, 2022).

The necessity of preparing the upcoming generation of educators for the incorporation of technology in the classroom has been emphasized by Tondeur et al. (2019). Furthermore, a number of governments have introduced technology policies (Salas-Pilco, 2021) that advocate for early AI awareness. Teachers must be ready for the introduction of cutting-edge technologies in the classroom, as there is still uncertainty about how to best use new technologies—especially AI in education (Mayer & Oancea, 2021).

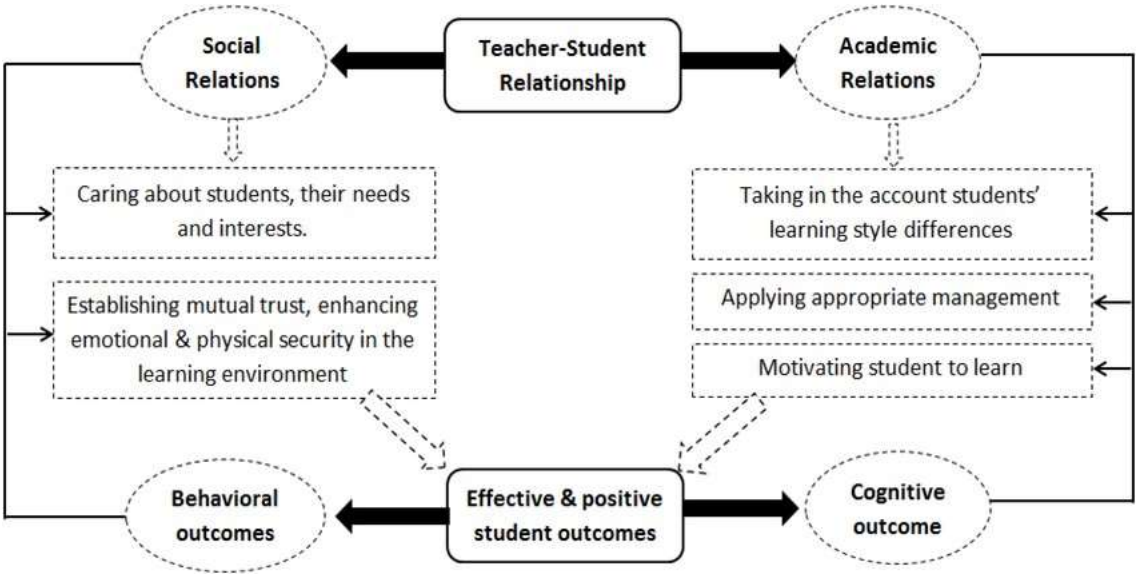
Personalized education includes one-to-one instruction with or without the use of technology (Kolchenko, 2018). However, adaptive learning programs do not understand the wide range of the all-important pedagogical contexts. The question highlighted in this research is the extent to which AI limits the ability of teachers to shape students' character (Saputra et al., 2023).

1.1. Theoretical Framework

Moore (1989) defined three forms of interaction: learner-to-learner, learner-to-instructor, and learner-to-content. Martin and Bolliger (2018) demonstrated that the learner-instructor interaction is the most significant of Moore's three types of interactions. The four factors associated with teacher-learner relationships are: communication, support, presence, guidance and social intimacy (Seo et al., 2021). Instructors may boost student engagement and learning by offering a range of communication channels, support, encouragement, and prompt feedback.

Figure 1 illustrates the conceptual framework of this research based on the factors associated with the teacher-students' relation according to Seo et al. (2021).

Figure 1. Conceptual Framework



1.2. Purpose

This research investigates the impact of AI implementation in schools and its effect on the teacher - learner relationship in the age of AI. It aims to explore the current perceptions and practices in the implementation of AI in Lebanese secondary schools as well as the opportunities and threats that AI may pose on the teacher-learner relationship.

1.3. Research Questions

1- What are the current practices in the implementation of AI technologies in the Lebanese secondary school settings?

2-What are the opportunities and threats on the teacher-learner relationship associated with the integration of AI in education, as perceived by educators and students? How do they compare?

1.4. Rationale and Significance

The advent of AI is causing a major upheaval in the education sector. AI has the capacity to drastically alter our approach to education. While some studies examined the advantages of AI in education a more thorough grasp is required to successfully integrate this technology in classrooms. The threats regarding the teachers' role which is getting less recognized in the AI era

is crucial. AI technologies can tailor educational content to meet individual students' learning speeds, styles, and interests, potentially increasing engagement and improving outcomes. Seo et al. (2021) recommended that research should consider the different learner–instructor interaction. This research holds significant value for educators, policymakers, and educational technology developers. By investigating the impact of AI on student learning, teacher support, and potential challenges, the research can inform evidence-based decisions about AI implementation in schools. Ultimately, the goal is to ensure that AI is used effectively to create a more inclusive and successful learning environment for all students.

1.5. Literature Review

A growing body of research highlights the transformative potential of AI in education. The integration of AI in education has the potential to revolutionize the learning experience for students (Kaledio et al., 2024). AI presents a unique opportunity to address UNESCO's call for "inclusive and equitable quality education" (Pedro et al., 2019). Proponents of using AI in education cite several advantages that can improve students' educational experiences. Some advantages that artificial intelligence (AI) offers to education include personalized learning, instant feedback, improved collaboration, access to educational materials, intelligent learning analytics, and continuous learning support (Makhmudovich, 2023). AI can tailor learning experiences to individual student needs and preferences, fostering deeper engagement and improved outcomes (Owoc et al., 2019). AI technologies can provide students with immediate and targeted feedback, it can analyze vast amounts of data to identify student strengths and weaknesses, enabling educators to provide more effective support, and to adjust their learning strategies (Makhmudovich, 2023).

Wardat et al. (2024) highlights the rising expectations of educators regarding AI integration in diverse learning environments. This recent study sheds the light on the potential of AI as an educational tool, emphasizing teacher perspectives on how AI systems and applications integrated into curriculums can facilitate teaching and enhance student performance. This burgeoning field has even led to the coining of the term Artificial Intelligence in Education (AIED) (Jauhiainen & Guerra, 2023), encompassing the various applications of AI within educational settings.

However, teacher perceptions of AIED vary (González-Calatayud et al., 2021). Factors such as pedagogical views, past teaching experiences, exposure to educational technology, and perceived effectiveness of specific technologies can influence teachers' willingness to adopt AIED. Research

suggests that teachers generally anticipate AI to improve teaching and learning in two key ways: a) Enriched learning experiences, through the use of digital learning resources and the potential for more engaging multimodal human-computer interactions (Jarrah et al., 2023); b) Personalized instruction, by catering to individual student needs and addressing learning difficulties even within large class sizes (Mahmoud, 2020).

Even though AI has many positive effects on education, there are challenges and threats that need to be resolved. The main challenges and threats are related to privacy and data security, ethical consideration, excessive reliance on artificial intelligence, equity and access, talent development, and implementation costs (Anica-Popa et al., 2021). By proactively addressing privacy concerns, ethical considerations, and equity issues, educators and policymakers can leverage AI technology to its full potential, fostering improved student learning while upholding principles of justice and equality in education (Kaledio et al., 2024).

Despite the potential of AI, Langreo (2023) emphasized that some aspects of education remain firmly within the human domain, there are still things that teachers do that AI just cannot. AI, while capable of processing vast amounts of data, lacks the depth of critical thinking and reasoning that humans possess. AI does not understand social-emotional learning and mental health issues; it is unable to replicate the personal connections teachers build with their students. Thus, AI will not replace the core work of teachers that supports positive learning experiences: inspiring and motivating students while helping them discover and explore their passions. Although AI provides efficiency and accuracy, some aspects of learning, such as the development of social skills and the education of emotional intelligence, are best carried out by human teachers (Makhmudovich, 2023).

2. Methodology

A mixed-methods research design was implemented, blending quantitative surveys for teachers and students, and qualitative semi-structured interviews. The questionnaire was established based on the theoretical framework and after careful examination of the literature. The first version was reviewed by two experts in the field of education to ensure content validity, then pilot testing was

implemented and Cronbach alpha was calculated to be .716 which shows reliability. The questionnaire quantitatively assessed broad perceptions and attitudes of teachers and students toward AI's impact on the four factors affecting the teacher-learner relation, utilizing Likert-scale items. Subsequently, semi-structured interviews with 10 participants: 5 teachers and 5 students through convenience sampling were implemented to explore in-depth experiences, providing nuanced insights into how AI influences teacher-learner interactions.

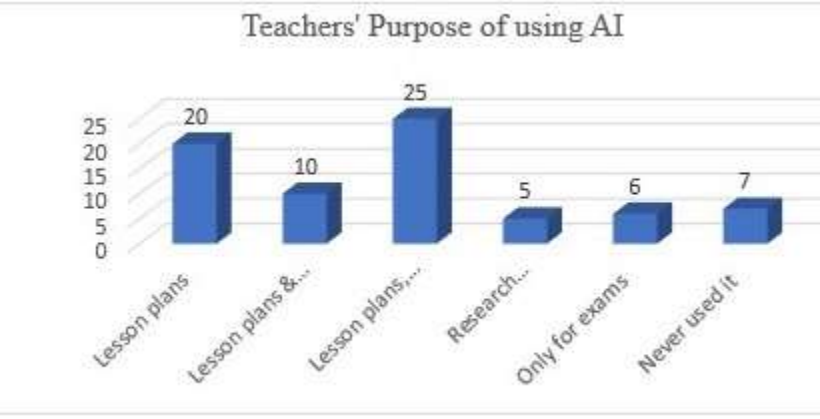
Data analysis implemented statistical techniques for survey responses and thematic analysis for qualitative data, aiming to integrate findings to comprehensively understand the multifaceted impacts of AI on learning dynamics. Ethical considerations, including informed consent and confidentiality, were addressed throughout the study.

3. Results

The questionnaire was filled by 73 teachers and 173 students from both public and private Lebanese secondary schools. 82 % of the participant teachers have more than 10 years of teaching experience.

The results showed that 74 % of the student participants and more than 72 % of the teacher participants utilize AI tools. Participant teachers mainly utilize AI tools for lesson planning and for preparing students' assignments and exams, as presented in Figure 2.

Figure 2. Purpose of using AI in Education as Reported by Teachers



Moreover, the interviewed teachers highlighted the importance of AI as a source of information

when searching for a new topic. '*AI can aid teachers in their practices, and save plenty of time and effor*t', one of the participants answered. '*AI can support the teacher with more information on any topic*', according to another participant.

Table 1 shows the answers of teachers and students related to the impact of AI on the teacher-learner relation. Comparing students' and teachers' answers, it is evident that both responses were similar. In spite of the fact that teachers and students both agreed that AI can make learning more engaging, they disagreed that AI could replace teachers in the classroom. The majority of teachers and students agreed that AI cannot replace the ability of teachers to provide emotional support to students but students who rely heavily on AI will consequently have weaker relationships with their teachers.

Table 1. Teachers' and Students' Answers to the Questions related to the Impact of AI on Teacher-Learner Relationship

		Strongly disagree	Disagree	Agree	Strongly Agree
AI could replace teachers in the classroom	Student	35 (20%)	73 (42%)	45 (26%)	20 (12%)
	Teacher	23 (32%)	34 (47%)	9 (12%)	7 (9%)
AI can make learning more engaging and interactive	Student	1 (1%)	27 (15%)	92 (53%)	53 (31%)
	Teacher	2 (3%)	7 (9%)	42 (58%)	22 (30%)
AI can effectively replace teachers' ability to provide emotional support and encouragement	Student	44 (25%)	64 (37%)	50 (29%)	15 (9%)
	Teacher	14 (19%)	38 (52%)	13 (18%)	8 (11%)
Students who rely heavily on AI develop weaker relationships with their teachers	Student	6 (3%)	36 (21%)	83 (48%)	48 (28%)
	Teacher	0 (0%)	15	44	14
AI could create a more impersonal learning environment	Student	5 (2%)	48 (28%)	107 (62%)	13 (8%)
	Teacher	3 (5%)	25 (34%)	38 (52%)	7 (9%)
AI can provide a level of personalized attention that can strengthen the teacher-learner relationship	Student	2 (1%)	30 (17%)	124 (72%)	17 (10%)
	Teacher	0 (0%)	18 (25%)	50 (68%)	5 (7%)
The use of AI in classrooms will decrease the need for teachers to build rapport with students	Student	6 (4%)	56 (32%)	93 (54%)	18 (10%)
	Teacher	0	41(56%)	28 (38%)	4 (6%)
AI can replace teachers' ability to provide emotional support and encouragement	Student	44 (25%)	64 (37%)	50 (29%)	15 ((%)
	Teacher	14 (19%)	38 (52%)	13 (18%)	8 (11%)

The perceptions of teachers and students regarding the effectiveness of AI in education are displayed in Table 2. The majority of teachers and students agreed that AI can be helpful in personalizing students' learning experiences and can effectively assess students' learning progress. It can grant teachers time to prepare individualized activities for students. Most of teachers and students claimed that AI can provide immediate feedback to students. Overall, AI can improve education as reported by teachers and students.

Table 2. Perceptions of Students and Teachers Regarding Effectiveness of AI in Education

		Strongly disagree	Disagree	Agree	Strongly Agree
AI tools can be helpful in personalizing students' learning experiences	Student	2 (1%)	5 (3%)	117 (68%)	31 (18%)
	Teacher	2 (3%)	7 (10%)	55 (75%)	9 (12 %)
AI can effectively assess students' learning and progress	Student	1 (1%)	14 (8%)	120 (70%)	38 (21%)
	Teacher	1 (1%)	15 (21%)	47 (64%)	10 (14%)
AI can free up teachers' time to focus on more individualized instruction	Student	1 (1%)	34 (19%)	109 (63%)	29 (17 %)
	Teacher	0 (0%)	5 (7%)	50 (68%)	18 (25%)
AI can provide immediate feedback to students improving their learning	Student	1 (1%)	11 (6%)	120 (70%)	41 (23%)
	Teacher	2 (3%)	11 (15%)	50 (68%)	10 (14%)
AI has the potential to improve education	Student	2 (1%)	9 (5%)	103 (60%)	59 (34%)
	Teacher	0 (0%)	7 (10%)	55 (75%)	11 (15%)

Overall, 64 % of the total participants believe that AI has a positive impact, and have the potential to improve education.

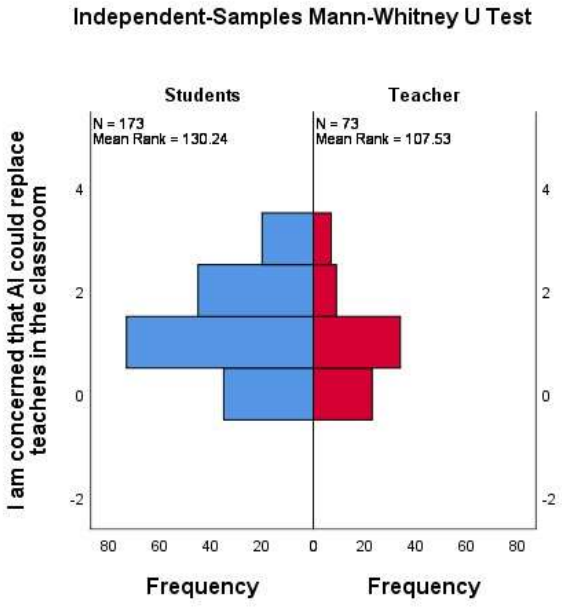
The Mann-Whitney U test is an appropriate and effective method for analyzing Likert scale data due to its non-parametric nature. It relies on ranks and is suitable for ordinal variables. This test allows researchers to make meaningful comparisons between groups without the stringent requirements of parametric tests, providing a robust tool for analyzing subjective, ordinal data in educational and other social science research (Leard Statistics, 2024). Mann- Whitney U test was implemented to compare the teachers and students' perceptions about their concern that AI could replace teachers (Table 3).

Table 3. Independent-Samples Mann-Whitney U Test

Total N	246
Mann-Whitney U	5149.000
Wilcoxon W	7850.000
Test Statistic	5149.000
Standard Error	481.726
Standardized Test Statistic	-2.419
Asymptotic Sig.(2-sided test)	.016

Moreover, comparing the medians of students' and teachers' rankings on their level of concern about AI replacing teachers (Figure 3), showed higher rank for students (Mean rank= 130.24) compared to teachers (Mean rank= 107.53), this indicates a higher level of concern. This suggests that the students are more concerned than teachers that AI could replace teachers.

Figure 3. Comparing the Medians of Students' and Teachers' Rankings on their level of Concern about AI Replacing Teachers



Similarly, notably significant differences were observed regarding the impact of AI on the need for teachers to build rapport with students ($p = .008$), suggesting varied expectations about the interpersonal dynamics influenced by AI integration in classrooms.

On the other hand, thematic analysis of the students' and teachers' answers related to the impact of AI on the teacher-learner relation are summarized in Table 4. Teachers believe that AI can enhance their pedagogical content knowledge and facilitate personalized learning, positioning them more as facilitators. However, they also acknowledge the double-edged nature of AI, which may distance students from teachers. Conversely, students appreciate AI's ability to tailor learning to their needs and improve communication but worry it might weaken the teacher-student relationship.

Table 4. Teachers' and Students' Answers to Open-ended Questions Regarding to the Effect of AI on the Teacher-learner Relationship

Teachers	Students
There will be no negative effect if the teacher has a high level of pedagogical content knowledge	AI can help teachers tailor their approach to students' needs and learning styles
More personalized learning so teachers will be facilitators	AI can help teachers and students communicate, allowing for more effective and meaningful interactions both within and outside of the classroom.
AI has a double-edged sword. It helps the teacher but at the same time makes the students away from the teacher	It empowers students but may cause weak relationships between the teachers and the students

Table 5 summarizes the important ideas in which AI can be beneficial for the teacher-learner relationship. Teachers believe that AI facilitates interactive sessions, individualized instruction, and differentiated teaching, allowing them to engage students more effectively and spend more time interacting with them. Students appreciate AI for providing personalized learning, diverse resources, and support for struggling learners, which leads to increased engagement and more opportunities for their queries to be addressed.

Table 5. Teachers' and Students' Answers to Open-ended Questions Regarding to Situations where AI could be Beneficial for the Teacher-Learner Relationship.

Teachers	Students
Interactive sessions	Teachers will vary their teaching methods
Individualized instruction with teacher as a facilitator	Personalized instruction which provides students with responsibility on their learning
Multiple representations	Using variety of tools and resources
Teacher prepares a more engaging setting for students	Students are more engaged in lessons.
Differentiated instruction becomes easier	Struggling students can seek help from AI
Teachers need less time for planning and lesson preparation and more time for interaction with students	Students feel that the teacher has more time to answer their queries.

Situations in which AI can negatively impact the teacher-learner relationship as perceived by teachers and students are reported in Table 6. Teachers are concerned that improper use of AI could confuse students and yield incorrect or unreliable information that needs justification. Students worry that AI might distract them with entertainment rather than study, provide conflicting information compared to teachers, and ultimately lead to confusion.

Table 6. Teachers' and Students' Answers to Open-ended Questions Regarding to Situations where AI could Negatively Impact the teacher-learner relationship.

Teachers	Students
Improper use of AI will make students confused	Students may use the internet for entertainment and not to study
AI may yield wrong information	Students will get the lost if the information from AI is different from that given by the teacher
The information is not reliable but needs to be justified	Students may get confused

4. Discussion

To answer the first question of research: What are the current practices in the implementation of AI technologies in the Lebanese secondary school settings?

The results of the questionnaire showed that more than 70 % of the participants utilize AI tools. Secondary Lebanese teachers highlighted the use of AI in preparing their lessons, exams, and students' assignments. This aligns with the study of Wardat et al. (2024) which sheds light on the potential of AI as an educational tool.

The interviewed teachers emphasized that AI tools can generate customized lesson materials, quizzes, and activities based on specific topics or learning objectives. This can free up teacher time for more creative endeavors and allow for differentiated instruction catering to diverse student needs. This aligns with previous research about the potential of AI tools in enriched learning environments, and personalized instruction to meet the needs of each individual student (Jarrah et al., 2023; Mahmoud, 2020).

To answer the second question of research: What are the opportunities and threats on the teacher-learner relationship associated with the integration of AI in education, as perceived by educators and students? How do they compare?

Cross analysis of the data collected showed that AI has the potential to be a powerful tool for teachers. More than 60% of teachers and students agreed that AI can create a personalized learning environment strengthening the teacher-learner relationship. However, it's important to use it thoughtfully and prioritize the human connection between teachers and students to ensure a successful learning environment. AI is a supportive tool and not a replacement for teachers.

The two main positive impacts of AI emphasized by participants are: personalized and engaged learning. According to the participants AI is able to evaluate student data and customize learning to meet each student's needs. This gives teachers more time to facilitate learning by leading students on individualized learning journeys and encouraging a deeper understanding. Students' learning can be enhanced through the use of AI tools leading to a more positive and engaged environment.

On the other hand, the participants shed light on two main negative impacts of AI integration: 1- Overdependence on AI: If teachers rely solely on AI-generated lesson plans and lack strong pedagogical skills, students might miss out on the human element of learning. The ability to

explain concepts clearly, answer unexpected questions, and provide emotional support remains crucial. 2- Misinformation and Confusion: AI systems can provide inaccurate information. If students don't critically evaluate the information they receive from AI resources, it could lead to confusion and a disconnect with the teacher's instruction.

Benefits and threats of implementing AI in education have been investigated in many researches. According to Anica-Popa et al., (2021), the primary threats and obstacles pertain to over-reliance on artificial intelligence, data security and privacy, ethical deliberations, fairness and accessibility, talent cultivation, and implementation expenses. Educators and policymakers may fully utilize AI technology to promote better student learning while maintaining the values of justice and equality in education by proactively addressing privacy concerns, ethical considerations, and equity challenges (Kaledio et al., 2024).

5. Conclusion

In the era of AI, it is crucial to study its impact on education and specifically on teacher-learner relation. This research investigated the current practices and perceptions of teachers and students in Lebanese secondary schools in the implementation of AI, as well as the opportunities and threats posed on the teacher-learner relationship. Results showed that the majority of teachers and students are utilizing AI tools, believing that it has the potential to enhance the bond between teachers and students by personalizing learning journeys, bridging communication gaps, and creating engaging experiences. However, a human-centered approach is necessary for AI to be a transforming tool rather than a destructive force. Instructors must continue to be in charge, using AI to improve their pedagogical abilities and give each student more individualized help.

The majority of the participants agreed that AI cannot replace a teacher's ability to provide emotional support. AI is not able to reproduce the human relationships teachers have with their students, nor can it comprehend mental health difficulties or social-emotional learning (Langreo, 2023). AI will therefore not take the place of instructors' fundamental responsibilities, which involve inspiring and motivating pupils to explore their hobbies and support pleasant learning experiences. According to Makhmudovich (2023), while AI can be efficient and accurate in certain areas, human teachers are still the greatest choice for teaching social skills and emotional intelligence instruction. Thus, the human element remains irreplaceable, a teacher's ability to

inspire, provide emotional support, and adapt to unexpected situations cannot be replicated by AI.

The future of education lies in a powerful synergy between human expertise and technological innovation. When teachers embrace AI as a supportive tool, they can create a classroom environment that fosters not just knowledge acquisition, but a lifelong love of learning for all students. However, educators need training on effectively integrating AI tools into their teaching practices.

Finally, future research should explore the optimal balance between AI-driven instruction and the irreplaceable role of teachers in areas like motivation, social-emotional learning, and critical thinking. Moreover, research should focus on developing ethical frameworks for AI use in education to ensure fairness and student privacy.

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