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OPPORTUNITIES AND ETHICAL CHALLENGES OF AI LEARNING TOOLS: PERCEPTIONS OF UNDERGRADUATE STUDENTS IN PUNJAB, PAKISTAN

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Abstract

The application of artificial intelligence (AI) tools in the field of higher education is rapidly growing and is used to manage learning, research, and academic outcomes. In addition to these opportunities, students also faced with ethical, privacy, and fairness related issues. This paper focuses on the perceptions of the undergraduate students regarding the possibilities and challenges of the AI-driven learning tools in Pakistan, Punjab. The research design adopted was a quantitative descriptive study and 200 undergraduate students of various universities in Punjab participated in the study. A structured questionnaire that relied on a five-point Likert scale was taken in order to collect student's opinions about the use of AI in education, ethical issues, critical thinking, transparency, and accessibility. The SPSS was used to analyze the collected data by use of descriptive statistics, frequencies, percentages, means, and standard deviations. The results show that students have a generally positive attitude towards the use of AI tools which include personalized learning, effective teaching research, accessibility and academic achievement. Nonetheless, serious negotiations were also highlighted pertaining to privacy, biasness data, absence of transparency, excessive reliance on AI, as well as the significance of human control. The paper finds that despite the great educational potential of AI-based technologies among the students of the university in Punjab, ethical provisions, institutional support, and awareness of learners of its ethical usage are all that is needed to find a useful and responsible application of AI.

INTRODUCTION

Artificial intelligence (AI) has become a disruptive element in the field of higher education that has altered the way students learn, comprehend information, and perform academic operations radically. AI refers to any computer-based system that is able to perform tasks which are traditionally performed by the human brain (such as solving problems, making decisions, language understanding, and recognizing patterns) (Russell and Norvig, 2021). The applications of AI in learning include adaptive learning systems, automated assessments and feedback, plagiarism detection system, virtual tutor, and research-support systems (Luckin et al., 2016; Holmes et al., 2019). These technologies continue to be utilized in the teaching and learning setups in universities around the world. AI is seen as a powerful tool that can be used to improve the quality, efficiency,

and access in higher education in different parts of the world. There is empirical data that AI has an opportunity to enable individualized learning, i.e. content can be customized to the needs of individual students and their pace of learning (Zawacki'-Richter et al., 2019). The AI-based systems also provide only instant feedback, enhance student interaction, and help them solve intricate academic tasks in a more efficient way (Holmes et al., 2022).

The international institutions, including UNESCO (2021) and OECD (2021), emphasize the possibility of AI to remove educational inequalities, and it should be introduced in a responsible and inclusive manner. In less developed nations like Pakistan, the implementation of AI in tertiary education is at its inception phase but has a fast pace of growth, especially in the urban and semi-urban areas of Punjab, which is the biggest province in the country. The use of digital learning platforms, learning management systems, online libraries, and AI-based tools to support teaching, assessment and research is increasingly becoming common in Universities in Punjab. The introduction of AI technologies in universities is also risen by the growth of online and blended learning systems, particularly in the post-COVID 19 crisis (Dhawan, 2020; Shahzad et al., 2021). As a result, undergraduate learners in Punjab are developing a habit of using AI-affiliated learning tools. Although there is a plethora of opportunities offered by AI, the spread of its use in the education sector has sparked severe ethical, social, and pedagogical issues.

Researchers believe that AI applications are generally based on massive amounts of information, which can threaten the privacy and safety of students who have not agreed to its use (Floridi et al., 2018; Williamson and Eynon, 2020). Issues of algorithmic bias have also been cited as AI systems can be sources of existing social inequalities as per training information (O'Neil, 2016). Such concerns especially become timely in educational institutions where the regulatory framework and ethical rules of AI application remain immature. One more significant issue in terms of AI in educational activities is the possible effects of AI on critical thinking, creativity, and self-education of the students. Although AI applications can facilitate the academic work, excessive use of the automated systems can deter the problem-solving skills and self-efficacy of the students (Bandura, 1997; Selwyn, 2019). Scientists are warning AI not to replace human learning but augment cognition work and teacher instruction (Holmes et al., 2019). Where AI use is largely uncontrolled, as is the case in the more contextually specific areas like Punjab where educational quality and equity have continued to be major issues, the digital divide between high and low digital-access students could only widen.

2: Research Gap:

Although the integration of AI-driven learning technologies in higher educational institutions is currently gaining momentum across many countries globally, limited empirical data on the perception of undergraduate students in Punjab, Pakistan is hard to find. In existing studies, a focus is mainly oriented on the application of artificial intelligence in developed countries or other generalized higher education settings, which does not address any specific cultural, infrastructural, and ethical factors of the situation in Pakistan (Holmes et al., 2019; Zawacki—Richter et al., 2019). Punjab In Punjab, where online educational resources and AI-powered tools are increasingly becoming a prevalent trend among universities, students face certain obstacles, such as the lack of awareness regarding the ethical regulation, the problem of privacy and the presence of algorithmic bias, as well as the lack of institutional standards.

Despite the opportunities of artificial intelligence to offer personalized instruction, better accessibility, and academic progress, the local empirical evidence of describing these benefits is significantly scarce. As a result, this study aims to overcome an essential gap in knowledge also because it focuses on exploring the possible advantages, as well as the ethical issues of AI learning tools through the perspectives of undergraduate students in Punjab. The results are expected to provide context-specific information

that can guide the responsible use of artificial intelligence in the Pakistani higher education.

3: Research Questions:

1. What are the challenges faced by undergraduate students in Punjab universities while using AI-powered learning tools?
2. What opportunities do AI-powered learning tools provide to undergraduate students in Punjab universities to enhance their learning?

4: Literature Review

The use of artificial intelligence (AI) has gradually become a mandatory aspect of higher education, which has radically changed the practices of pedagogical leadership, approaches to assessments, and even the work of institutions (Russell and Norvig, 2021). The definition of AI implies that there are computerized systems that perform functions that are traditionally linked with human thinking, such as problem solving, decision making, linguistic understanding, and pattern recognition (Russell and Norvig, 2021). AI technologies in the educational setting take the form of adaptive learning systems, automated assessment systems, plagiarism detection systems, virtual tutors, and research support systems (Luckin et al., 2016; Holmes et al., 2019). Such innovations have become common in all universities around the world to improve learning outcomes, promote teaching efficacy, and increase access (Zawacki-Richter et al., 2019; Holmes et al., 2022). AI-based tools can offer personalized learning experiences, and the instructional material can be tailored based on the needs and the individual development of each learner (Zawacki-Richter et al., 2019). These systems have the ability to provide real-time feedback, allow the learner to engage, and help students to solve intricate academic problems more effectively (Holmes et al., 2022). The AI usage also leads to creating new teaching models and facilitates research efforts by automating the routine tasks, thus allowing the teachers to pay more significant focus on higher-order cognitive facilitation (Luckin et al., 2016; Holmes et al., 2019).

The benefits are strong ethical and social issues associated with the introduction of AI in education. AI systems require a large amount of data, thus raising concerns about privacy, data security, and the degree to which students have clearly agreed to the use of their personal data (Floridi et al., 2018; Williamson and Eynon, 2020). In addition, there is a risk of algorithmic bias, where the AI tools reproduce the pre-existing social inequities in the training data and this may lead to discriminative results (O'Neil, 2016). This issue is acutely topical in academic institutions in which regulation, policy frameworks, and ethical standards are in their infancy (Holmes et al., 2019; Selwyn, 2019).

The effects of AI on critical thinking, creativity, and self-directed learning in students have also been criticized. Although artificial intelligence can automatize academic work, students could lose the ability to solve problems, making self-efficacy weak (Bandura, 1997; Selwyn, 2019). According to the scholars, AI must not replace human pedagogical instruction or independent mental work, but must supplement it (Holmes et al., 2019). Punjab is the case where the quality and equity of education is the issue at hand, and improper use of AI can only increase the digital gap between the technologically advantaged and disadvantaged students (Dhawan, 2020; Shahzad et al., 2021). Besides that, international organizations, such as UNESCO (2021) and OECD (2021), suggest the responsible and inclusive use of AI but there is little empirical evidence on the topic of perceptions of undergraduate students in Punjab, Pakistan. The literature on AI currently focuses on developed nations or in generic education settings, overlooking the cultural, infrastructural, and ethical specifics of Pakistan (Holmes et al., 2019; Zawacki-Richter et al., 2019). Online learning materials and AI-related tools are becoming more popular among students in Punjab; however, the lack of awareness of ethical standards, privacy concerns, algorithm bias, and institutional anchored problems continue to be an under-researched problem.

As a result, a subtle perception of the opportunities along with the ethical issues related to AI tools in the local context is a must. Empirical research that represents the student attitudes can provide answers to the responsible integration of

AI into higher education and help the institutions to develop the policies that would maximize the benefits and minimize the risks (Floridi et al., 2018; Selwyn, 2019; Dhawan, 2020).

5: Methodology

5.1 Research design

In this research, the research design chosen was quantitative descriptive research design that aimed to examine the perceptions of undergraduate students about AI-based learning tools in Punjab, Pakistan. This choice was made because of the ability of the quantitative descriptive approach to collect, summarize, and analyze numerical information about the attitudes and experiences of the participants in a systematic manner (Creswell, 2014; Johnson and Christensen, 2019). This type of approach is especially relevant in the estimation of the occurrence of particular perceptions and in the determination of emergent tendencies and issues related to the integration of AI in the education field.

5.2 Population and Sample

The target group was made up of undergraduate students who were studying in a range of universities in Punjab, Pakistan. Punjab is the most populous province in the country and as such its number of institutions providing programs in the arts, sciences, and technology is very high. The number of students who were recruited using convenience sampling was 200, which is a common method used in research in the education field to reach easily accessible participants who agree to give information (Etikan, Musa, and Alkassim, 2016). There was a mix of both the public and the private universities to represent different educational settings across the province.

5.3 Instrumentation:

The information was gathered with the help of the structured questionnaire that is modified after previous studies on the topic of AI in education (Holmes et al., 2019; Zawacki-Richter et al., 2019). The tool consisted of five major sections:

- Demographic- age, gender, university affiliation and major.
- The opportunities of AI perceptions- questions about the level to which AI tools contribute to the customized learning process, assist in the research, increase accessibility, and advance academic outcomes.
- Views of ethical issues- questions that pose privacy, security of data, transparency and bias in AI systems.
- Effect on learning abilities- critical thinking, problem solving and creativity assessment.
- General attitudes towards AI in the field of education on balance between positive and negative views.

The opinions of respondents were measured by rating each item on a five-point Likert scale. The questionnaire was piloted on 20 students and it was made clear, reliable and valid; later minor changes were made which led to better understanding and relevancy within Punjab, Pakistan.

5.4 Data Collection:

The survey was distributed online and face-to-face, depending on the availability and the preferences of the respective universities. The participants were provided with a brief explanation of the aims of the study, guarantee of anonymity and confidentiality as well as instructions to fill the survey on their own. A period of four weeks was taken to collect data to ensure sufficient participation.

5.5 Data Analysis:

Gathered data was analyzed in SPSS. The findings were summarized using descriptive statistical methods and include:

- Frequencies and percentages in order to outline the demographic data.
- Averages and standard deviations of every questionnaire question to clarify the general perceptions and patterns.
- The use of tables to display information in a clear and easy to read format.

6: Findings

6.1. Demographic profile of participants

Demographic	Category	Frequency (n=200)	Percentage (%)
Gender	Male	102	51%
	Female	98	49%
University Type	Public	120	60%
	Private	80	40%
Major	Arts	60	30%
	Science	90	45%
	Technology	50	25%

The sample was equal percentage of male 51 and female 49 students representing both public 60 and private 40 universities in Punjab. The sample was made up of a variety of academic subjects, most of them were in science 45%, then arts 30%, and technology 25%.

6.2. Opportunities of AI Learning Tools

Opportunity Aspect	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Std. Dev
Personalized Learning	4	6	20	100	70	4.2	0.85
Academic Support / Research	3	7	30	110	50	4.0	0.82
Accessibility of Resources	2	5	25	120	48	4.1	0.79
Academic Achievement	3	6	35	105	51	4.0	0.81

Most of the students say they either agree or strongly agree that AI facilitates individual learning and academic success. The averages are above 4, which shows that there are positive perceptions on the whole.

6. 3. Ethical and Practical Challenges

Ethical Concern	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Std. Dev
Privacy Concerns	5	15	30	100	50	3.95	0.91
Algorithmic Bias	4	12	35	95	54	3.92	0.88
Transparency Issues	3	10	40	105	42	3.88	0.85
Overreliance on AI	6	10	30	110	44	3.94	0.87

The issue of ethical concerns is well accepted. The most reported problems are privacy and algorithmic bias. Mean scores are around 4, which means that the students share the same opinion about the significance of using AI responsibly.

6.4. Effect on Learning Abilities

Learning Aspect	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Std. Dev
Critical Thinking	5	15	50	90	40	3.75	0.88
Problem-Solving Skills	6	12	40	95	47	3.81	0.85
Creativity	7	14	48	85	46	3.77	0.87

Students acknowledge that AI can be beneficial but partially undermine free thinking and creativity. The neutral reactions signify that there are students who are not certain about the negative effects.

6.5. Overall Attitude towards AI in Education

Statement	Agree / Strongly Agree (%)
AI enhances learning outcomes	80%
AI increases accessibility	84%
AI may reduce critical thinking	60%
AI needs human oversight	88%
Overall positive view of AI	82%

The perceptions of AI benefits among students are very positive. Ethical and transparency concerns are realized and learning-skill concerns are identified. Responsible integration, supervision and awareness are also being strongly called for.

7: Discussion and Implications.

7.1 Discussion of Findings within the Context of AI in Higher Education.

The research findings of this study indicate that undergraduate students in universities in Punjab, Pakistan largely have positive views regarding the usage of AI-driven educational tools. According to the respondents, AI applications assist with personalized teaching, improving access to the scholarly materials, and help with research-related tasks. These findings align with the current body of literature indicating that the ability of AI to promote learning effectiveness and educational outcomes with the help of adaptive content presentation is possible (Zawacki-Richter et al., 2019; Holmes et al., 2022).

The high-level agreement on the topic of personalized learning and accessibility implies that students view AI as a supplementary learning tool, but not a replacement of traditional pedagogy. This is in line with the fact that AI has the potential to enhance teaching and learning activities as long as it is incorporated intelligently and not disruptive (Luckin et al., 2016; UNESCO, 2021). Particularly topical is the situation in Punjab, where the stimulation of the movement to digital platforms and AI-based applications is increasing in the conditions of the post-COVID-19 environment (Dhawan, 2020; Shahzad et al., 2021). The data show that the students are not blind followers of the AI technologies. Issues that were related to privacy, algorithmic bias, transparency, and overreliance were common and often stated. These fears resemble international discussions regarding the ethical application of AI in school, which highlights the dangers of data exploitation and upholding of inequalities through biased algorithms (Floridi et al., 2018; O'Neil, 2016). The fact that such anxieties have emerged in the cohort of undergraduates in Punjab indicates that there is an upsurge in consciousness of the ethical aspects, despite the fact that formal AI governance systems are still immature.

7.2 The Issue of Ethics and the necessity to use AI responsibly.

An important observation made in this research is the high level of anxiety among the learners about their privacy and security of information. The learning systems that are driven by AI usually rely on the large amounts of student data, thus raising the questions of the informed consent and data protection (Williamson and Eynon, 2020). The relatively large average scores on the issues of privacy suggest that the respondents are still concerned about the risks, despite the fact that they still use AI tools in their academic pursuits. The concerns regarding the bias in algorithms and the lack of transparency emphasize the awareness of the students that AIs can reproduce already existing inequities. As O'Neil (2016) notes, algorithms are not neutral and do not lack the biases that they were trained on. One of the scenarios under which the uncontrolled AI application may widen the existing inequalities in digital access and learning resources is the Punjab milieu. The presented findings support global demands of moral principles and institutional control to facilitate equity and responsibility in AI-enhanced education (OECD, 2021; UNESCO, 2021). The students resoundingly expressed that artificial intelligence tools require human control. This supports the idea that AI must be seen as an aiding technology with human supervision and control and not an autonomous decision-making body in the education setting (Holmes et al., 2019). The statistics suggest that students place importance on a moderate stance where AI supports, but does not replace, human judgment and pedagogical engagement.

7.3 Artificial Intelligence, Learning Skills, and Student Self-Efficacy.

Results on critical thinking, problem-solving, and creativity provide a more detailed account. Although students recognized the benefits of AI tools, a significant number of them were neutral or apprehensive about the effects of the tools on higher-order cognition. This is in line with what Selwyn (2019) expresses, where over depending on AI is likely to limit the participation of students in independent critical thinking and learning. Theoretically, these findings can be placed in the self-efficacy theory (Bandura, 1997). In case students rely too much on AI to complete their academic assignments, they might lose their ability to believe in their own ability to think critically and solve academic problems on their own. The neutrality of the answers that can be noticed here indicates the lack of certainty and not necessarily denying the role of AI in the learning process of students, which means that they are still in the process of negotiating its position in their learning process. This highlights the need of pedagogical guidance. Lacking a systematic integration and clear delimitations, AI tools can end up hindering deep learning. On the other hand, in tactical deployment, AI may be used in the learning process and still be able to maintain student freedom (Holmes et al., 2022).

7.4 Conclusions on Teaching and Learning Practice

The aftermaths that are the result of this research are complex in reference to higher-education practice in Punjab. To begin with, universities must be leaders in promoting AI tools in pedagogic as well. The faculty members should be trained to be not only technically proficient, but also methodologically oriented to promote critical thinking, creativity and student agency. Undergraduate studies should incorporate ethical literacy. The increased concern of students with the problem of privacy, prejudice, and openness implies the willingness to participate in ethical considerations. Responsible AI use can be taught within the framework of formal education to enable learners to select their options informally and reduce the risk of misuse, which is why it is advised that global ethics are based on ethical competence as the chief element of digital education (UNESCO, 2021). AI tools are to be presented as supplementary as displacing technologies. Having clear institutional policies can prevent the problem of overreliance on AI and promote its positive use in assisting research, making it accessible, and providing individualized instructions.

7.5 Policy and institutional Implications

Institutional level: the study highlights the need to place specific AI policies in the Pakistani universities. These policies must cover the protection of data, transparency, and accountability and thus protect the rights of students. Since the use of AI tools in universities in Punjab is rapidly expanding, policy interventions may come late, which may result in uneven practices and an ethical flawed outcome.

Policy-wise: findings can be used by higher authorities of education to design national AI-in-education frameworks. Localized evidence in the context of Punjab illustrates the significance of adapting the global rules of AI to the realities of infrastructural and cultural contexts (Zawacki-, Richter et al., 2019).

7.6 Summary of Discussion

Overall, the findings suggest that undergraduate learners in Punjab find AI-based learning tools as useful educational instruments and they continue to be aware of their ethical and pedagogical dilemmas. The research supports the existing studies that propose responsible and human-centered AI integration in institutions of higher learning. This study provides context-driven evidence to the current discussion on the use of AI in a developing-country context through foregrounding student views.

8 Limitations of the study

Despite its contributions, this study has a number of limitations that should be considered when explaining the findings. To begin with, the study used a quantitative descriptive design and based itself on a self-administered questionnaire as the sole source of data, which could be insufficient to gather the in-depth nature of the experiences and personal thoughts of students in relation to the use of AI learning tools. There can also be some responses that are conditioned by social desirability bias or inadequate knowledge of the concepts of artificial intelligence. The sample size was 200 undergraduate students, which were chosen with the help of convenience sampling in various universities across Punjab. Even though some participants were selected by selecting both the public and the private institutions, the findings cannot be applied to all university students in Pakistan. The other provincial students, the rural students, the students of other levels of academics may be having divergent perception. The research only centered on the frequencies, percentages, means, and standard deviations. There were no inferential statistical methods used to investigate the relationship or differences between variables. Therefore, the study does not explain causal relationships, but rather defines perceptions. The research considered the use of AI only through the lens of students. The perspectives of teachers, administrators, and policymakers have not been included, and thus, it did not allow a thorough analysis of institutional preparedness and ethical governance related to the implementation of AI in higher education.

9: Conclusion

The study examined the possibilities and ethical concerns related to the field of the artificial-intelligence-based learning tools, and relied on the views of undergraduate students pursuing their education at various universities in Punjab, Pakistan. The sample covered the group of participants represented in various institutional settings thus providing a rather all-encompassing image of the student attitudes to AI integration in the context of higher-education institutions. The empirical findings can identify that a positive attitude toward the application of artificial intelligence in education is usually present among students. It was noted that AI-driven tools helped to support individual instruction, assist in academic learning, increase access to curricular materials, and, as a result, overall academic performance. The research presupposes an array of ethical and practical issues. Algorithms bias, data-privacy intrusion, system-design obscurity and excessive dependence on AI mechanisms were identified by respondents as major problems. Additionally regardless of the assumed advantages of AI, respondents expressed conflicting stands regarding its impact on critical thinking, creativity, and problem-solving abilities and emphasized the necessity of an integrated and moderated adoption. The results show that AI-based learning

materials have significant potential in improving the quality of higher education in Punjab. However, effective and morally acceptable integration shall be based on clear instructions, institutional support, increased student consciousness, and constant human monitoring. It is based on this that university administrators and policy makers must focus on building sound ethical guidelines, specialized training programs and regulation guidelines to make sure that AI serves as an auxiliary feature and not as an alternative to human pedagogical engagement. Providing context-specific empirical evidence, the given study contributes to the limited body of literature on the topic of artificial intelligence in Pakistani higher education and presents practical implications to educators, administrators, and potential researchers who are interested in enhancing the responsible and effective application of AI in the realm of university education.

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