Artificial Intelligence application in Education

Roxana Yolanda Castillo-Acobo, David Raul Hurtado Tiza, Lucy Marisol Guanuchi Orellana, Betzy Zeytel Llerena Cajigas, Freddy Toribio Huayta-Meza, Crisostomo Quispe Sota, Gloria Irene Suáña Muñoz, Jesus Enrique Reyes Acevedo, Manuel Antonio Cardoza Sernaqué, Christian Paolo Martel Carranza, José Luis Arias Gonzáles

1Universidad Nacional de San Agustín de Arequipa, rcastilloa@unsa.edu.pe
2Universidad Nacional Autónoma Altoandina de Tarma, dhurtado@unaat.edu.pe
3Universidad Nacional Micaela Bastidas de Apurímac, iguanuchi@unamba.edu.pe
4Universidad Nacional Intercultural de Quillabamba, betzy.llerena@uniq.edu.pe
5Universidad Nacional de Huancavelica, freddy.huayta@unh.edu.pe
6Universidad Andina del Cusco, crisostomoqs71@gmail.com
7Universidad Técnica del Altiplano, gloriairene_@hotmail.com
8Universidad Nacional Autónoma de Alto Amazonas, jreyes@unaaa.edu.pe
9Universidad San Ignacio de Loyola, manuel.car doza@epg.usil.pe
10Universidad de Huánuco, christian.martel@udh.edu.pe
11University of British Columbia, Joseariasgon6@gmail.com

Abstract
This research aimed to examine the potential of artificial intelligence (AI) for use in higher education and to assess the consequences of using AI in this setting. The research uses demographics like age, gender, and field of study might affect the implementation of AI in classrooms using analysis of variance or ANOVA methodology. The study included 209 participants, or 52.2% of the population, with 100 male and 109 female participants. In the results there was a large age and major-related divide in how respondents used AI in the classroom. Younger respondents were more likely to indicate extensive use of AI in the classroom. Neither men nor women reported significantly different rates of AI use in the classroom. Another interesting finding is that respondents enrolled in STEM-related programs were more likely to use AI in the classroom than those enrolled in other programs. Based on these results, age and field of the study appear more influential than gender when it comes to the application of AI in the
classroom. This research has the potential to inform the creation of policies and tactics that will increase the prevalence of AI in classrooms across all ages and subject areas. Due to its limited sample size and focus on a single institution, the University of Lima in Peru, the study has certain caveats. Keywords: Education, Artificial Intelligence, students’ perception, Technology.

Introduction

New technologies and the ever-increasing processing capacities of new intelligent machines are intrinsically linked to the future of education. Innovations in artificial intelligence in this field pose new challenges and possibilities for faculty in institutions of higher learning. They may cause significant shifts in the organization and management of today’s educational institutions (Hwang et al., 2020). No one seems to have landed on a thorough description of artificial intelligence that everyone can agree on, despite several attempts dating back to Aristotle. Education is essential for people in third-world countries. According to Munir, Vogel, and Jacobsson (2022), the 2018 Horizon study found that the average school would need between two and three years to use AI and adaptive learning technologies (Arias, et al., 2022; Mamani, et al., 2022). Experts expect a 43% growth in the use of artificial intelligence in educational settings between 2018 and 2022, but the Horizon Report 2019 suggests that this figure could be much higher (Munir, Vogel & Jacobsson, 2022).

The Peruvian digital learning community concluded that “there is little question that AI technology is intrinsically tied to the future of higher education (Mansilla, et al., 2022; Puma, et al., 2022).” Both for-profit corporations like Google, which recently spent $400 million to acquire the European AI startup Deep Mind, and non-profit public-private partnerships like Germany’s DFKI (German Research Centre for Artificial Intelligence) have made significant financial commitments to the field of artificial intelligence research. This interest will significantly impact higher education institutions (Fahimirad & Kotamjani 2018; Ramos et al., 2022). For instance, 50 new professorships at the AI Systems Institute at the Netherlands Technical University in Eindhoven have recently been announced. It is impossible to overstate the importance of a country’s educational institutions to that nation’s development (Cope, Kalantzis & Searsmith, 2021). Knowledge and skills are the most critical factor in a person’s financial and social success. Those with a higher level of education are better positioned to improve their standard of living since they are more likely to obtain higher-paying, higher-skilled employment. Hence, education has far-reaching ramifications for the people of developing countries, as it empowers individuals to pursue their unique paths in life and
ultimately achieve greater levels of personal fulfillment (Campbell, 2022). Increased economic development and social progress throughout the country are additional benefits of investing in education and producing highly educated graduates, which is especially true of emerging nations (Castillo-Acobo, et al., 2022). So, in a developing country like India, the role of higher education becomes more important, and the learning process should be adjusted accordingly.

All around the world, in the previous few decades, there has been a technological revolution. In contrast to the past, where economics and politics determined social progress, today’s knowledge-based society is driven by innovation and originality (Klemt et al., 2022; Gavilan, et al., 2022). In the past, most academic works was completed by hand, and classroom interaction between teachers and students was a central feature of the educational system. However, in the last 20 years, people’s perspectives on education and the workplace have shifted thanks to the Internet and other technological advancements (Baker, 2000). A new idea known as "artificial intelligence" has emerged recently. It's common knowledge that universities require a lot of people to work hard. Not only does this add to the operating costs of universities, but it also likely contributes to an uptick in error rates and overall processing times.

Due to the labor-intensive nature of the higher education system, universities will need sizable funding to pay for faculty, train new staff, and manage data. Institutes are losing money due to the expensive cost of hiring and retaining qualified staff. They must also expend many resources to ensure all students are accepted, learn, and graduate (Klemt et al., 2022). According to Pedro et al. (2019), a significant amount of time and energy is spent in universities on unnecessary, repetitive chores. As this is such a labor-intensive industry, it stands to lose both money and people. So, the higher education sector will benefit from a more cost-effective and flexible strategy thanks to the implementation of artificial intelligence. In this regard, the main objective of this research is to study how artificial intelligence impacts students' learning process and determine demographic respondents on AI and its impact on the education process.

Research on the use of AI in education is crucial for a number of reasons, not the least of which is the need to ascertain the extent to which it can enhance learning, to which it can raise ethical and privacy concerns, and to which it can be integrated into educational systems in a way that maximizes its benefits while mitigating its risks.

Artificial intelligence (AI) has the potential to radically alter the educational landscape by individualizing the learning experience for
each student, raising student engagement and performance, and streamlining administrative tasks. Yet, there are worries that AI will disrupt the roles of teachers and students and worsen existing inequities in education. There are also ethical considerations relating to data privacy and security.

Research Problem
Determining the efficacy and impact of AI in bolstering scholastic outcomes is at the heart of the study problem surrounding AI's implementation in education. Artificial intelligence (AI) is a cutting-edge technology with game-changing potential in the classroom. Scholars and policymakers disagree on whether it helps students learn more. Several studies have demonstrated that AI can enhance student interest, individualized instruction, and academic achievement (Xing & Zhang. 2019). The Organization for Economic Cooperation and Development (OECD, 2019) conducted a study that indicated AI's ability to tailor learning experiences led to better reading and math scores among high school students.

There are, however, worries that AI will favor kids with better access to technology and resources, further widening the gap between disadvantaged and advantaged students. Concerns about AI's impact on students’ privacy and ethics are also not universally shared.

The education market for AI is expanding significantly, according to statistics on its use in the field. HolonIQ (2020) predicted that by 2025, the global market for artificial intelligence in schools would be worth $6 billion. Also, the report notes that 2019 will see a 47% rise in investment in AI in education compared to the previous year, reflecting the growing popularity of using AI in classroom settings. There is still a need to assess the efficacy and influence of AI in education despite its growth and potential (Lee & Kim, 2019). Thus, the challenge of AI research in education is to find ways to integrate AI into systems in a way that benefits students while also avoiding unethical or problematic outcomes.

Literature Review
What is artificial intelligence?
Artificial intelligence (AI) is the simulation of human intelligence in machines or robots, allowing them to do tasks previously reserved for humans. Artificial intelligence (AI) has risen to prominence across industries thanks to robots’ increasing ability to mimic human thought and behavior. From high-tech sensors to friends and family, AI is
increasingly present in every facet of modern life. Many significant shifts have occurred in higher education because of recent advances in AI (McCarthy, 2007). All parties involved, including teachers and students, gain from incorporating AI into the educational process. When it comes to completing jobs that normally require human knowledge and rational thinking, artificial intelligence (AI) is the capacity and development of a data innovation-based Computer framework or other machines. Even while artificial intelligence (AI) has the potential to make the world a better place, it is not without its share of difficulties (Briganti & Le Moine, 2020).

To illustrate, consider autonomous automobiles. Cars that don't require human drivers usher in a new era of transportation innovation. It greatly benefits the auto industry and its customers from a monetary and practical standpoint. Autonomous vehicles free their operators from driving duties and reduce collision rates (e.g., weariness driving). In the long run, self-driving cars will make human drivers obsolete for jobs like driving taxis, delivery trucks, and ridesharing services like Uber.

Artificial Intelligence's role in Education

John McCarthy held a two-month workshop on artificial intelligence at the cradle of the field in the 1950s at Dartmouth College in the United States. When describing his ideas for a workshop in 1956, John McCarthy used the term "artificial intelligence" for the first time (McCarthy, 2007). That all aspects of learning and intelligence can be specified precisely enough for a computer to be built to reproduce them is central to artificial intelligence. Researchers will investigate areas including language, abstraction, concept development, problem-solving, and self-improvement to train machines to act like humans.

Artificial intelligence is useful in higher education to several studies, which highlight that implementing such technology allows for more adaptable learning options for students. Due to AI's enhanced flexibility and speed, institutions worldwide are seeing a rise in student enrollment (Fetzer & Fetzer, 1990). The cost of incorporating technology into the classroom has also been high, albeit it is still reasonable when weighed against the price of other manual labor. Artificial intelligence (AI) in higher education has the potential to drastically lower costs over the long run compared to those associated with current teaching methods and human labor. To paraphrase Baker (2000), AI refers to "computers that do cognitive operations, traditionally associated with human minds, particularly learning and problem-solving." They emphasize that "AI" encompasses more than one type of technological advancement. This umbrella term encompasses many subfields, such as machine learning, natural language processing, data mining, neural networks, and algorithms.
AI has been widely implemented in the world's affluent nations. But, compared to developed nations, emerging nations are just starting with AI. Financing, a shortage of experienced specialists, and a lack of institutional support are just a few of the barriers developing countries encounter when attempting to implement AI in higher education. Artificial intelligence (AI) is utilized in the grading process in schools so that teachers can automate the grading of a predetermined set of questions. Adaptive and personalized education using AI can help meet the needs of all pupils. According to Schiff (2021), artificial intelligence helps educators gauge their pupils' level of comprehension during class and equips them to offer helpful hints. It acts as a tutor, helping students grasp challenging ideas with ease. Projects fueled by AI provide valuable feedback to instructors and students alike. It motivates teachers to monitor their student's progress and gives them the tools they need to enhance the instruction they provide. Artificial intelligence (AI) frameworks in the classroom have altered how pupils discover and collaborate on coordinated innovation. This impacts teachers because it equips students with the knowledge they may intuitively apply to their studies.

Artificial intelligence (AI) supports and improves student learning, so they can confidently use an experimental techniques to learn new things. There will be profound shifts in student recruitment, instruction, and support brought about by using AI frameworks. It could replace teachers in various settings. It's become an educational companion that facilitates students' learning (Zawacki-Richter et al., 2019; Claudino et al., 2019). Artificial intelligence (AI) fosters a supportive atmosphere, which is very helpful for students learning qualities and processes. Any methods of enhanced learning, processing, and instruction through electronic means fall under the umbrella of artificial intelligence. Murphy et al. (2022), learners can tailor their time in these AI-influenced environments to their requirements and interests. So, we can say that AI is a well-designed tool that allows learners and teachers to pursue the learning process successfully by providing a flexible arrangement, cooperation opportunities, options, and control over the learning process. Teachers also have a role to play in implementing AI in academic settings. Teachers can use AI to construct classrooms where students can ask questions, get clear answers, and form lasting relationships with their professors and classmates (Murphy et al., 2022).

The entire world has gone digital. The impact of the Internet on classrooms cannot be denied. Individuals in education and training now have boundless opportunities thanks to the rapid development of technology. As computer usage grows in popularity worldwide, so has the field of artificial intelligence, with its primary application in
classroom settings. This AI provides several useful features for use in educational settings. The use of computers in the classroom could be beneficial for both teachers and pupils (Klemt et al., 2023). Artificial intelligence (AI) has become increasingly significant in today's universities since the advent of the computer.

Many programs are designed for various fields of study and professional development courses. What areas of education, especially higher education, might benefit from your familiarity with AI? Dirican (2015) categorizes the current AI software used in education as follows: a) individual instructors, b) intelligent support for collaborative learning, and c) intelligent virtual reality. Teaching methods that have been used for decades can fail when trying to convey concepts that are at once straightforward. Even so, AI can make a difference using cutting-edge software and hardware. Compared to other, more surface-level education methods, classroom learning has more potential from an AI’s point of view. Therefore, there is a desire to include AI in official and casual classroom settings.

How AI has impacted Education

Future job markets and required skill sets would radically differ from the present because of the job substitutes and relocations brought about by AI (Alam, 2020; Crompton & Song, 2021; Nagendran et al., 2020). Several studies have shown that routine and organized jobs are more amenable to computerization and so are more likely to be automated away by AI. The more human supervision is involved in a task, the more difficult it is for AI to take control. The point of college should be to help students learn to adapt and grow as individuals and as a society.

There are many facets of higher education that AI will impact, but the two most important are curriculum and student enrollment. To begin, AI will have far-reaching effects on the structure of higher education. AI's strengths are its rapid processing, high accuracy, and reliable behavior. Attempting to compete with AI in these areas is fruitless (Castro & New, 2016). However, AI is still inadequate in fields requiring nuanced knowledge, such as "creativity, invention, critical thinking, problem-solving, socializing, leadership, empathy, teamwork, and communication." It's not always wise to ignore the significance of "science, math, and engineering," for instance. Learning the fundamentals of science and mathematics is essential to a well-rounded, advanced education that provides kids with the tools and experiences they need to develop their more nuanced skills. Some schools already provide AI and Machine Learning courses to software engineering students and business students because managers and authorities in the business world need to be familiar with AI's possibilities, limitations, and consequences.
The admissions process is another area where we may see the impact of AI on higher learning (Parton, 2006). According to Castro & New (2016), majors in the arts and humanities may gain popularity as they are less vulnerable to an "AI invasion." Artificial intelligence (AI) has the potential to reduce enrollment in fields like accounting and economics drastically. Similarly, the wealth divide and the potential for millions (if not billions) to be unemployed mean that expensive postsecondary education might never again be accessible to the masses.

Intelligent tutoring systems (ITS) can sometimes fill in where a human tutor would normally be needed. A student's tailored learning route and content selection can be determined using learner models, algorithms, and neural networks; after that, students can receive cognitive scaffolding, assistance, and discourse depending on these judgments. Because one-on-one human mentoring is challenging in massive open online courses (MOOCs) with thousands of students, ITS holds great promise. Several studies have demonstrated that dialogue and teamwork are essential to learning (see Fetzer & Fetzer, 1990). Nonetheless, there’s a requirement for facilitating and moderating online communication (Baker, 2000). AIEd can contribute to collaborative learning and aid human tutors in steering students toward course goals by supporting adaptive group construction based on learner models, boosting online group interaction, and summarizing dialogues (Woolf et al., 2013). Intelligent virtual reality (IVR) is then built utilizing ITS to engage and direct students in authentic VR/game-based learning environments. For example, virtual agents can serve as teachers, guides, and even students' equals in online or remote labs.

**Methods**

The University of Lima was used as a case study for this study. Randomly selected participants from the University took part in a framed questionnaire to help in data collection to get their perception of AI use in education. The data result helped answer this study's key objectives, as listed in the introduction.

The students at the University of Lima were surveyed to learn more about their thoughts on using AI in education. For this research, we used a Likert scale to gauge respondents' levels of agreement with statements about how AI might be useful in the classroom.

The participants in this research are undergraduates enrolled at the University of Lima. Current undergraduate and graduate students, totaling 209, will make up the sample. A straightforward random sampling strategy will be used to select the sample. According to the
data in table 1 and the illustration in figure 1 in the result section, one hundred men and ninety-nine women filled out the survey.

**Result and Discussion**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>100</td>
<td>48%</td>
<td>48%</td>
</tr>
<tr>
<td>Female</td>
<td>109</td>
<td>52%</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>209</td>
<td></td>
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</table>

From 209 participants, 109 were female gender representing 52% of the total participants and the remaining participants were male gender representing 48% of the total participants. Additionally, the distribution can be visualized in figure 1 below. Colleges under consideration have a nearly equal male-to-female ratio. The graph also shows that the number of female respondents is higher than that of male respondents, which makes sense given that education is the only industry where most women prefer to work due to its flexibility of working hours.

Figure 1: Gender distribution figure
Homogeneity test for variances

Table 2: Homogeneity test

<table>
<thead>
<tr>
<th>Test for Homogeneity</th>
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<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Levene's Statistic</td>
<td>degree of freedom</td>
</tr>
<tr>
<td>16.01</td>
<td>3</td>
</tr>
</tbody>
</table>

Levene's Test for the Equality of Variance is used to check if the samples' standard deviations are comparable. The term "homogeneity of variance" describes the situation in which the variances of different samples are the same. The equality of variances is an assumption made by some statistical tests like the analysis of variance. That hypothesis can be checked using the Levene test. In most cases, a significant difference is indicated by a high number, whereas a low value shows a little difference. Based on the data in Table 2, we may conclude that the demographic variable. Gender is meaningful as \( p = 0.000 \) and the Levene's test was determined to be 16.01, as shown in table 2 above.

Table 3: ANOVA result

<table>
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<th>ANOVA</th>
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<tbody>
<tr>
<td>SS</td>
<td>Df.</td>
</tr>
<tr>
<td>Between-group</td>
<td>0.687</td>
</tr>
<tr>
<td>within groups</td>
<td>204.909</td>
</tr>
<tr>
<td>Total</td>
<td>208.187</td>
</tr>
</tbody>
</table>

When comparing male and female respondents, there was no discernible difference in using AI in the classroom \( (F = 1.086, p = 0.299) \). This suggests no significant difference between male and female respondents who reported using AI in the classroom. The respondents' ages made a difference \( (F = 5.342, p = 0.006) \) in how they felt AI should be used in the classroom. There was a significant age difference in how often AI was used in classrooms, with younger respondents reporting more frequent use than their elders. Variations in Programs: Students' perspectives on using AI in the classroom varied significantly by major \( (F = 3.146, p = 0.044) \). Students enrolled in STEM programs were more likely to have used AI in the classroom than in other programs. As Gender's p-value \( (0.687) \) is more significant than 0.05, we reject the alternative hypothesis that there is a difference in how male and female educators perceive the effect of AI on their pupils' education.
This reveals that male and female educators share the same view on how AI will affect education.

Conclusion
Growing AI use is not an excuse to ignore the serious discussion regarding AI's place in education. Technology and the resulting loss of jobs have been widely acknowledged, but this only highlights the need to rethink the role of teachers in classrooms. Students' perspectives on "study the perspectives of the teachers about learning through AI with special reference to the selected universities of Lima" are revealed, allowing for a deeper investigation into how various contemporary artificial intelligence methods adopted by universities affect students' ability to learn. The study also shows that although the potential of AI in higher education institutions is promising and has many possibilities in this field, the status of AI in higher education institutions requires a significant investment of money and effort. So, institutions looking to implement AI must carefully assess a wide range of aspects to ensure that the technology will improve teaching and learning.

The question of who is responsible for education may arise due to using AI or IT technologies to detect plagiarism. Also, because AI software uses complex algorithms that might transfer their biases into operating systems, it can replace several tasks fundamental to teaching practice in higher education (Siau, 2017). Traditional instructional practices are being rethought in light of AI in today's universities. Therefore, schools can anticipate the potential gains and losses associated with implementing AI in the classroom (Siau, 2018). These methods keep the core values and ultimate goal of higher education intact while making it more accessible to more people.

The study has also highlighted how AI could be implemented to the advantage of university students, faculty, and administration. The 17 sub-types were divided evenly across four significant groups (profiling and prediction; intelligent tutoring systems; assessment and evaluation; adaptive systems and personalization) (Voss, 2017). This paradigm, constructed from a review of the relevant literature, helps think about and evaluate AIEd research and practice.

Educators still have a lot of room to strive for innovative and meaningful research and practice with AIEd that could have a learned impact within higher education, such as adopting design-based approaches, because quantitative methods - especially quasi-experimental methods - dominate in empirical studies. A current study on individualization in educational technology may be found in the systematic literature review undertaken by Kurzweil (2010); Rainie &
Anderson (2017). These results were consistent with those of other research that looked at the role of mathematics in creating innovative technology. Findings from a systematic review of Learning Analytics by Gibney (2017) indicate that "there are very few implementation and effect studies."

Limitations and Recommendations

It is possible that the study’s sample size is too small to be statistically significant. As a result, the study’s results may not apply outside of the specific conditions under which they were gathered. However, the study's focus may be too narrow, preventing it from offering a complete picture of AI's potential in the classroom. This suggests additional, potentially crucial dimensions to the topic that have not yet been investigated. Furthermore, it used cross-sectional data, which may not be indicative of the long-term trend of AI implementation in classrooms. Thus, the results of the study may not be valid or dependable over the long term.

Most of the studies included in this meta-analysis simply analyze and uncover patterns in data to construct models and to generate predictions that guide student and teacher facing applications or that support administrative choices based on decades-old mathematical theories and machine learning approaches (see Russel & Norvig, 2010). With the advancement of processing power and the abundance of readily available massive digital student data, this type of study is now feasible. Yet, there is currently scant evidence demonstrating how AI-driven educational technology improves pedagogical and psychological learning theories. Privacy problems, data protection, and algorithmic prejudice are only a few examples of ethical difficulties that should be considered in future research on the use of AI in education. That way, teachers may feel comfortable incorporating AI into their curricula, knowing that the technology will be used in a moral and respectful manner. To better understand the causes and mechanisms of this dynamic development, which will have far-reaching effects on higher education institutions in the various areas we’ve covered, this systematic review has important implications for encouraging researchers to be more explicit about the theories that underpin empirical studies about the development and implementation of AI in education projects.

Research determinant

The information gathered would be analyzed using the ANOVA statistical method. Using this method, we might compare the two sets
of data and see if there are statistically significant differences between them about AI's ability to enhance learning outcomes in schools.

Sampling: A sample of 209 students, teachers, and other stakeholders in the education system should be statistically representative of the entire population of interest. Random sampling procedures should be used to pick the sample to maximize the likelihood that the results will be applicable to the entire population of interest.

Data can be acquired in a variety of ways, including through questionnaires, interviews, and direct observation. It is important that the research topic and the research plan inform the choice of data gathering method.

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