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Artificial Intelligence In Education: Redefining Curriculum Design And Optimizing Learning Outcomes Through Data-Driven Personalization

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ABSTRACT:

Purpose: This scholarly work explores how AI can be used to promote the curriculum development process and result in improved learning outcomes of the learners in a personalized learning approach in learning institutions. It looks at how education AI is applied to set individually tailored courses and how effective such a personalized solution is. This paper also explores other variables impacting the utilization and success of AI in learning, familiarity with AI, position in learning, and years of experience.

Objective: Thus, the purpose of this study is to evaluate the effectiveness of the use of AI in the context of the curriculum and to examine the current deployment of AI in learning and teaching context based on teachers, learners, and educational managers' perception. In analyzing these relations, the study seeks to establish the practical proof of AI applications in enhancing learning processes and challenges that hinder their practice.

Methodology: The research approach used was quantitative and cross-sectional survey data was obtained from 200 respondents, teachers, school leaders, and students. The information was collected from an on-line questionnaire, including 70 items calibrated into closed type questions. This paper sought to establish the level of awareness of participants on AI, how they employ AI tools and their attitudes towards the effect of AI in the area of curriculum and learning. These variables were analyzed for relationships and inter-relationships between them using Chi-Square tests and other tests such as Spearman correlation coefficients and Kruskal-Wallis tests as well as simple logistic regression

analysis. Different kinds of graphs were used that included bar graphs, scatter diagrams and box plots to supplement the statistical analysis results while explaining the results and the data analyzed.

Results: Regarding the Role in Education and Use of AI-driven Tools there was no relationship between these variables (Chi-Square statistic = 2.178, p-value = 0.703, degrees of freedom = 4) which means that there is no distinction if a person occupy a high or low position in the education sector, the AI tools are being used. Also, no correlation was found between the extent of AI enhancing the curriculum and the degree to which AI-based personalization enhances the outcomes (Chi-Square statistic = 13.113, p-value = 0.361, degrees of freedom = 12). The Spearman correlation between Familiarity with AI and Belief in AI Improving Learning Outcomes was weak positive and non-significant correlation, with a correlation coefficient of 0.033 and p-value of 0.638. The Kruskal-Wallis test comparing the Extent AI Enhances Curriculum between the different roles in education also provided no discriminating values (Kruskal-Wallis statistic = 2.767, p-value = 0.598). Converging with the findings in the Logistic Regression analysis, Years of Experience was found as a predictor in the study as educators with less Years of Experience have significantly lower beliefs about AI effectiveness (coefficient = -1.186, p-value = 0.031).

Practical Implications: The study reveals that while AI-driven tools are being widely adopted across educational roles, their perceived impact on learning outcomes is not as straightforward as expected. However, for AI to be integrated rightly into curriculum design, more training and resource support should be provided such educationists especially those with less experience. Also, it is suggested that the educators or administrators who assume that the AI can significantly enhance their learning outcomes should consider shifting their attention to the particular types of AI that are more consistent with effective learning and instructional practices.

Novelty: This study contributes to existing literature on AI in education, highlighting research on the application of AI tools in curriculum development and perceived practical impacts of these tools on learning outcomes. Hence, instead of complicating the possibilities of utilizing AI with pedagogy, this work presents the experiences of individuals, educators and students, and therefore provides a useful outlook on AI use in learning.

Conclusion: As a result, the study finds that although the use of AI for curriculum improvement and improved learning achievement is promising, its effectiveness is a factor of how it is deployed and the environment in which it is applied. The results imply to promote professional development for the schools especially less-experienced teachers and underlined the evidence of integrating AI tools with effective instructional methods to enhance the learning procedures. Moreover, the present research discusses the ethical issues and potentials issues of AI use in education, which outline the directions for further research; such as, the potential effects of AI on academic achievement and the AI equality.

KEYWORDS: Artificial Intelligence; AI Integration; Personalized Learning; Learning Outcomes; Curriculum Design; Applications Based on AI; Artificial Intelligence in Education; Adaptive Learning; Educational Technology; AI in Education; AI-Driven Curriculum Design; Data-Driven Personalization; Adaptive Educational Technologies; Educational Outcomes; Intelligent Tutoring System.

INTRODUCTION:

Over the few years, education has been given a face lift through the new technologies most especially with the incorporation of Artificial intelligence. Introduction of AI into different domains of education helped create new opportunities aimed at improving education processes. Advanced technologies once only have entered classrooms globally as integrating assistive technologies, aimed at making the process of education more effective, adaptive and available. This shift is in line with the general trend towards the digitalization of education, in which technology plays a dual role as a tool that supports the educational process; and as an essential component of the educational process." As educators, administrators, and policymakers grapple with the potential and challenges of these technologies, a critical question arises: In what way can data enhanced AI be utilized to enhance curriculum alignment and enhance student achievement through personalization? (Frank, 2024).

The integration of AI in smart education is therefore anchored on the institute's ability to analyze large data set to come up with relevant insights that can be used in creating personalized learning models to suit the learners. As a concept, personalized learning has been under discussion in educational paradigm for quite a long time. Although, the recent development, in the field of AI has put the large-scale implementation of personalized learning systems into possible realm. Students' learning patterns can be analyzed; it will be possible to understand their strengths and weaknesses, provide them with comprehensible materials, and create tests for summing up the result of achievements. These ranges of customization can potentially trigger a variety of changes in regard to education, wherein students' differences will no longer be an obstacle for mass-tailored, inflexible standardized educational settings (Ejjami, 2024a).

However, given the above promising signs, the aforesaid effects of using AI in curriculum design, and learning achievement are still an ongoing research question. On one hand, several educators and researchers believe that AI helps towards differentiating instructions and increasing learners' engagement on the other hand, some concerns arise regarding the use of AI in the classroom from both ethical, practical as well as pedagogical perspectives. The purpose of this study is to identify the difference and relationships between possible application of AI in curriculum design and evaluation of learning outcomes and current use. Despite rich debates on the potential of AI to redefine education delivery and support models, the available literature has few qualitative investigations that explore the manner in which AI is currently being implemented in practice and the effect it has on learners and teachers (NATTAWUTTISIT & MANEERAT, 2024).

At the same time, most of the works concentrate on various potentials of AI technologies, while the role and impacts of these systems from the points of view of the direct users including educators, students, and administrators as active and regular users of learning management systems are less popular. This research aims at filling this gap by examining how curriculum enhancement is augmented by AI and how learning outcomes can be optimized, alongside the factors inhibiting its uptake in education facility. The topic of interest for this study is therefore, how artificial intelligence is altering curriculum development and enhancing learners' achievement experiences through customization. In detail, the research focuses on the following aspects: the use of AI in the creation of flexible learning models that address the learning needs of the target students by educators and administrators. It also aims at assessing the level of effectiveness of AI based personalization of learning in enhancing achievement of learning objectives according to the perception of educators and learners (Widono, Saddhono, Nurhasanah, Nugraheni, & Legowo, 2024).

Due to systematically capturing the views of practitioners directly involved in the process of creating and delivering education this work offers insights useful for utilizing the AI potential in practice. Furthermore, the study looks at the level of awareness and attitudes that come from familiarity with AI, position in education and years of practice regarding the impact of AI in improving curriculum development and learner achievement. To accomplish these goals, the current research designed the study under a quantitative research paradigm, using a structured questionnaires to gather the responses from educators, administrators, and students. The survey tool was developed to elicit the respondent's awareness about AI, their practice of AI-based products, and their opinion about AI influence on curriculum development and learning. The results of the survey were tested and compared using Chi-Square tests, Spearman coefficients, Kruskal-Wallis tests, as well as logistic regression (Tanweer & Ismail, 2024).

For analyzing the relationships between categorical, ordinal, and binary variables, these statistical tests were employed to effectively identify the factors which influenced the adoption of AI in education settings as well as concerning the effectiveness of using AI in such a setting. The conclusions are reflected in the results section of the work, which is supplemented with tables and diagrams that show the patterns and relationships in the data. The organization of this paper is done in a sequenced manner which will take the readers from the identification of the research problem to the presentation and analysis of the results. After that, based on the available literature, this paper's literature review critically analyses existing research on the use of AI in education and defines the research gaps within the current state of knowledge in the field (Iweuno, Orekha, Ojediran, Imohimi, & Adu-Twum, 2024).

The literature review also presents the theoretical background as well as definitions of the key notions concerning learner's individuality, learning, teaching curriculum, and the use of artificial intelligence in education from the ethical points of view. This paper's methodology section consequently outlines the research design and the procedures for collecting data and analyzing them so that other researchers can perform the study and obtain similar results when answering similar questions. In the results section, the observations and conclusions of the research process are reported with reference to quantitative and qualitative data collected and analyzed throughout the study without offering explanations or insights gained from data analysis. The subsequent section of the discussion firstly translates the findings with reference to the established research in the context of educators, policymakers, and potential future research studies (Ayeni, Al Hamad, Chisom, Osawaru, & Adewusi, 2024).

Last of all, conclusion provides findings of the study and outlines the implication of the study and suggestions for future research. This study advances the existing literature on AI in learning environment by presenting findings that assess the effectiveness of AI in curriculum and achievement. In that way, the study meets an important need for a grounded investigation into the difficulties and opportunities of implementing AI in practice at the university level. Furthermore, there is useful data regarding the correlation between concerns and characteristics engaged and concerned in the exploration that showed the future impact of expertise, familiarity AI, and the role in education for the perceptions of AI efficiency, including the imperatives and regimen for better support in schools and universities. As AI progressively integrates into learning environments, knowledge on how the latter inform curricular development and enhance students learning will be critical for instructors, leaders, and stakeholders (Sundari, Penthala, & Nayyar).

More than ever before, there is credible enthusiasm towards artificial intelligence and more so its incorporation into the education systems; these are characteristics of advanced digitization features pervading every stratum of society. With the pressures on educational systems rising due to technological developments and socio-political changes, AI may provide some of the solutions to the most acute problems in education, as those about individual learners, or students' attendance and participation, However, efficient application of AI in education faces challenges that are technological, and human based to enable efficient implementation of the systems. This research therefore seeks to offer insights into these matters towards developing a enhanced understanding of how AI could indeed be used to support and enhance the delivery of the learning curriculum and training outcomes in various kinds of institutions (De, 2024).

From among the contributions made in this research, it can be suggested that focusing on the end users' perspective, this study provides a rich insight into how AI is affecting education in practice and how it can be used more effectively in the future. The results of this research will contribute to the knowledge base of future studies as well as guide the implementation of AI in learning environments, promoting a good use of those solutions. This research therefore seeks to make the following contributions to the knowledge on AI in education; first, by conducting a critical synthesis of the literature on the subject second, by presenting a set of best practices and recommendations for its future application in curriculum models and learning enhancement (Kakhkharova & Tuychieva, 2024).

LITERATURE REVIEW:

Artificial intelligence or AI has especially enhanced different areas, including that of education. A new focus has been on the use of AI in curriculum development, and the improvement of learning outcomes through the use of individualized learning. Countless papers have been dedicated to how AI can improve various processes, learning approaches, and students' participation. However, despite the acknowledged potential of applying AI in education, the research analyses thinks out the generalities of how and in which manner AI can be meaningfully incorporated into curriculum delivery, and how the process affects learning outcomes. This paper extends and complements prior literature by critically analyzing published studies, noting the research gaps, and situating this research at the intersection of AI and education. Personalization is one of the benefits that has attracted the most attention to the use of AI in education. Here, the programmers and devices used in the classroom and the learning patterns assigned to each child are unique (Sajja, Sermet, Cikmaz, Cwiertny, & Demir, 2024).

Based on the study by Luckin et al., AI-based systems are beneficial to this task since they make data analyses and offer feedback to learners and professors in real-time. As such, AI makes it possible to develop smart environments through which educational materials can be updated based on progress of the learners. These adaptive systems assist in the requirements for aiming to transform traditional standardized base learning to a more personalized approach. However, most of the works done to date in this area still remain in the paradigm of the research literature. While there is a growing evidence of how AI can be utilized in educational settings many of them are more concerned with the technical possibilities of AI rather than elucidating practical use of AI to improve students' performance. For example, Holmes et al. call for the construction of ITS that employ the use of AI in presenting oneself as an instructional facilitator, guiding a learner through instructions as a tutor would do (Jdidou & Aammou, 2024).

Nevertheless, the number of empirical studies that can directly relate the effectiveness of AI supported personalized learning software to the students' satisfaction and achievements remain limited. Another area which is assumed to be improved by AI is curriculum development. Anderson et al. opine that curriculum design was previously a mechanical and time inclusive process where education endeavors arranged the content, activities and the assessment to fit their educational goals. However, by incorporating the use of Artificial intelligence into this process, the process can be made much smoother. In teaching and learning, AI can complement educators' work of improved curricular performance by evaluating the results of curricular data, determining poor performance in students' knowledge, and recommending the best of the gaps to be filled. AI can also be used towards creating adaptive learning curricula that constantly changes with the need and learning behaviors of the students (V. Singh & Ram, 2024).

This not only has impact of reducing time which teachers take to prepare lesson plans but also has the advantage of making the lesson plans current with the students' progress. It is a form of exemption to note that, though AI has potential in developing curriculum, there is little research on educators' views about the use of AI in this field. The present literature review identifies two major areas of study: the methods for applying AI into curriculum design, and the effect of these applications on learners; there is a lack of emphasis on the effects on educators who employ the technologies. For instance, in the article by Chassignol et al., the authors cover how AI can improve the learning process as a result of ascertaining teachers' propensity to recommend suggested curriculum changes, yet there is no touch on how teachers and curriculum designers feel about integrating such technologies into their practice (Verma, Dadhich, & Sharma, 2024).

Preservice teacher perceptions are significant to the successful implementation of AI because technology rejection may slow the advance and restrict the application of an AI system in education. Also, the students' and faculty members' concerns about the ethical implications of introduced AI technologies have not been investigated extensively in the current literature. Selwyn et al constitute some of the authors who have an issue with particular sets of bias living in AI algorithms especially in assessment and decision-making. As it has been discovered that AI systems are data-driven, there is a high probability that the prejudice that the education systems have is likely to be magnified. For instance, if the model analyzed data from students from given socio-economic background, or that filter might benefit students at the same time prejudice others. It is fearsome to think of the ramifications of such biased being the case especially in educational systems where AI participates in grading, admission or placement of students (Correia, Água, & Lobo, 2024).

To the best of the author's knowledge, the present study fills this gap by investigating the ethical issues of AI in learning context and identifying how educators can avoid AI bias. Another major issue, which has been identified in relation to bias includes issues of data ownership and security as the major hindrances to the usage of artificial intelligence in education. Zawacki-Richter and her team observe that data collection and data analysis are central to the AI systems. Such findings raise questions about how data of students is gathered, managed and utilized. Data privation is well sensitive when it comes to education since it involves persons below the age of 18 years and there are legal and professional regulatory requirements that forbid the disclosure of data belonging to the human subject. While numerous researchers have outlined safeguards to protect data privacy in AI-based learning systems, there is a need for more applied studies to determine how the established measures are deployed in the field, and whether they help alleviate stakeholders' concerns (Raja et al., 2024).

Many of the earlier studies have therefore focused on the efficiency of the AI in enhancing learning achievements. Research has revealed that use of AI can greatly augment learning achievements with specific reference to the reception and retention of knowledge by students. For example, Heffernan et al. Examined whether the learning mode enhanced by an AI-based intelligent tutoring system would enhance student outcomes by way of timely and individual feedback. According to them, students who employed AI smart learning methods had better chances of remaining focused a lot of time in the course study as well as pass/fail test exams than those who employed traditional studying approaches. Nevertheless, the present study's optimistic results imply future extensive longitudinal qualitative empirical studies concerning the effects of AI on learning achievements in various contexts of education (Sasikala & Ravichandran, 2024). Furthermore, studies are more likely to explore AI in subjects in which its utilization is simpler owing to the logical nature of the content, restricted to mathematics and science. Unlike humans, AI systems can go through numerical data, find patterns, and explain in subjects such as mathematics. Still, as mentioned by Luckin et al., there is not as many papers concentrating on how AI affects less formalized subjects as humanities and social sciences. In these fields, the content is much less objective, which hampers the ability of such systems, as AI to provide helpful feedback. This lack of literature points to the need to carry further research with an aim of find out how best to apply the AI in different subject areas and level of education. The use of AI in the classroom has been an area of growing interest as shown by various research which identify the potential and the issues arising from installation of artificial intelligence in education (Abulibdeh, Zaidan, & Abulibdeh, 2024).

For instance, Aoun et al. have specified how AI can support effective teaching by assuming routine responsibilities including grading and attendance taking so that educators can perform constructive tasks. But the authors also state that the teachers might have some concerns over the growing use of the AI systems in the classroom to teach students since it might cost them their jobs. This is especially the case in developing nations, where implementation of AI in learning may not be coupled with necessary seminars or indubitable professional development for instructors. This raises the questions of how teacher education programmers should prepare teachers for collaborating with AI and how the integration of AI should then happen to complement rather than supplant human expertise in education. Another point of view is the availability of AI technologies in education. Despite the ability of AI to deliver custom-made educational experiences to learners, the availability of AI is not consistent with the regions and SES of the learners (Sesay, 2024).

According to Kumar et al., low-income area schools or schools in the developing nations may not have the physical infrastructure, funds, and assets to put into practice AI technologies. This results in digital inequality: student who attend schools with funded teaching resources being able to use advanced AI technologies, while their counterparts at schools with limited funding cannot. That is why the authors of the literature recommend that the subsequent studies should be aimed at exploring how to increase access to the AI technologies so that all the students could have the best chance of benefitting from the AI no matter their socio-economic status. In sum, as the number of studies on the possibility that integrates AI into education is increasing, the following gaps can be highlighted: First, most research in this area is

concerned only with the technology inherent in AI, and very little emphasis is placed about how educators and students perceive the integration of such tools (Aammou, Tagdimi, & Jdidou, 2024).

Second, despite several positive examples of the use of AI in increasing the effectiveness of learning, there is a shortage of studies that would strengthen the (AI)'s positive impact on mastering the learning material, future experiments must consider a correlation between AI use and the stability of students' performance improvement, especially in free-form subjects. Third, there is a need for further discussion of the various ethical concerns that surround AI use in learning, including issues to do with bias and the use of students' data. Finally, access is still a major problem: many schools and regions still lack the infrastructure that would allow AI technologies for learning. Closing these gaps, the subsequent studies enable viewers to have a better understanding of how AI can enrich learning activities and curriculum (Makinde, Adeleye, Oronti, & Jimoh, 2024).

The current study aims to add the true knowledge by exploring the role of AI technology on improving the curriculum to help enhance learning accomplishments through analyzing and organizing the data on individual basis. Thus, through presenting the results of the survey carried out among educators, administrators and students this investigation intends to meet the lack of research on how AI is recognized and implemented in the context of education. This research also extends understanding of ethical issues and access barriers related to artificial intelligence to envision deployment of the technology that is efficient and fair. It is our intention, through the findings of this study, to shed light to the application of AI in the educational system and to contribute advice on how best different types of AI technologies can be utilized in order to benefit learners and their institutions (Marques-Cobeta, 2024).

METHODOLOGY:

The philosophy of research of this study is grounded in the study of the application of Artificial intelligence (AI) to customize curriculum and improve learners' results. This paper adopts a structured approach of the research onion model in defining the research design, data collection methods, sampling techniques and the methods of analysis. This holistic approach guarantees a vivid examination of the correlation between AI involvement within learning settings and the extent of its effectiveness in improving students' performance. In this study, research onion is used as a guiding framework which helps the researcher to understand and present the research decisions at each layer philosophically, technically and procedurally. The outermost layer in the conceptual framework of the research onion in the research philosophy (Ashraf, 2024).

This research uses the Positivism research philosophy it involves quantitative approach where structured means are used to collect and analyze results. The positivist approach is applicable in this study since it aims at finding out the extent to which various parameters of the population are related such as the level of familiarity with AI, the role of the respondents in the educational system and their perception of extent of integration of AI in the curriculum and the performance outcomes. Using variables and hypothesis along with data gathering techniques and statistical analysis, the study seeks to present an objective analysis of the phenomena of study within the given research issue and without much influence of the researcher's subjectivity. Going further inside the research onion it's evidently clear that the research approach applied to this study is deductive (Faccia, Ridon, & Cavaliere, 2024).

This strategy focusses on designing and carrying out empirical research to provide data that supports or disapproves put forward hypotheses. The deductive approach is more suitable in the study due to its objective in analyzing whether factors like the year of experience or the position of respondents in education will keep them from perceiving AI as useful to curriculum design and learning output. The current work aims to contribute to the development of a better understanding of the underlying frameworks within the field of AI in education by applying and testing accepted theories of technology adoption and educational innovation. Considering the presented research approach, the survey method was used for collecting data from educators, administrators, and students. The use of survey method was implemented since it ensures that a large amount of data is collected within a short time view by a cross-sectional method (Blessing, 2024).

The survey was made up of closed ended, structured questions to collect quantitative data on respondents' awareness of AI, their function in education, views on AI on curriculum and their opinion on whether AI will enhance learning outcomes. This made it possible for the study to apply statistical tests in determining the level of correlation or relationship between the variables since all the questions were structured and posed in the same manner all through the research exercise. Sampling technique used in this study was nonprobability convenience sampling. This sampling technique was considered suitable because the study aimed to interview participants who are engaged in some way in the education sector, as teachers, learners, school administrators, curriculum developers who in one way or another have come across AI as a concept or tool applied in education. The target population for this study was hence defined as the education employees in the selected states irrespective of their position or level in education sector (Goel, Singhal, Bhadoria, Saraswat, & Patel, 2024).

The sample size used in this study was 200 respondents whose responses were obtained from across the levels of education departments as noted in the results section. The particular subjects were chosen in accordance with the goals of the study, thus guaranteeing that the information received would be useful and can reproduce the target population's attitudes toward AI within the context of learning. Additional data concerning the role of the respondents in education, years of experience as teachers and their education level was also obtained for contextual purposes and for making the subgroup comparisons within a sample. The data in the study were gathered using an online self-administered survey questionnaire that was sent to the educators, administrators and students through e-mails and on the social media accounts. The use of online mode was chosen because of the access possibilities and convenience of responding from different locations (Zootzky & Pfeiffer, 2024).

This was the web-based self-administered questionnaire which was developed to be simple and It normally took ten to fifteen minutes of the participant's time to complete. Participants were also made aware of the purpose and goals of the present research and guaranteed of the anonymity of their answers. This ethical consideration was most helpful in that it allowed the participants to answer questions without any regard to how their responses would be used. After the data were gathered, several quantitative statistical tests were used to assess the variables interconnectivity. The kind of statistical procedures to be used was informed by the kind of data collected and the research questions. Since the data collected was categorical and ordinal, tests like Chi-Square, Spearman's Correlation, Kruskal-Wallis, and Logistic Regression were selected to analyze relations, correlation and predictive relation between attributes (Elimadi, Chafiq, & Ghazouani, 2024).

The Chi-Square Test was used to test hypotheses with regards to relationships between nominal scale variables for example the role of the respondents within the education sector and their adoption of AI tools. The reason why this type of analysis requires the Chi-Square test is that the Chi-Square test evaluates the relationship existing between two variables based on their categories via summarizing differences between observed and anticipated frequencies. This test aids in determining if the probability of occurrence of one variable varies with categories of another variable. Prior familiarity with AI and attitude towards AI enhancing learning outcomes were analyzed using the Spearman Correlation Coefficient, since the respective variables are ordinal. Spearman correlation is ideal for this analysis since it determines the level of relationship between two variables which are ranked. Linear regression and assumption of normal distribution with data is not required by this algorithm, hence it fits well with the ordinal results obtained from the survey (Miller, 2024).

Through this test, the research was able to determine whether those who are conversant with the use of AI are likely to have the perception that its use improves educational results. The Kruskal-Wallis Test was applied to analyze the difference about the perception of how far the AI helps on the curriculum design between participants from different roles in education area. This test is used when the assumptions of normality cannot be met and wanting to compare more than two independent groups on an ordinal dependent variable. It is used when making an analysis of variance test but is not as strict with its requirement of data distribution like the one-way ANOVA. Kruskal-Wallis test enabled the study to establish if there were significant differences in the teachers, students, administrators and other roles concerning the impact of AI on the curriculum (Sargiotis, 2024).

The data was, therefore, modeled with the aim of estimating the probability that respondents agree with the argument that AI enhances learning outcomes as the dependent variable, and other independent variables like familiarity with AI, years of experience, and role in education. Logistic regression when applied enables the researcher to model binary outcome variables; therefore, in this study, it helped examine the level of perceived benefit of AI on learning outcomes, given a situation where role in education or prior experience with AI either increases or decreases the likelihood of such a perception. The regression model was used to estimate predict variables associated with the levels of belief in positive outcomes of AI while accounting for the other variables (Sandhu, Channi, Ghai, Cheema, & Kaur, 2024).

During the analysis works, SPSS and Python were applied as the primary software instruments for data analysis and representing. These programs offered a rich facility performing statistical computations and allowed creating simple and intuitive graphical visualizations like bar plots, scatter plots, and box plots, which facilitated simplification of the findings presentation. Facilitating calculations of the Spearman correlation coefficients and the Chi-square, these visual cues, including the scatter plots for the Spearman correlation, and the bar charts for the Chi-square tests, were helpful in conveying the main relationships derived from the data. This study ensured that ethical issues were addressed as follows, during conducting the study. Informed consent for the study participation was achieved as all participants were told the objective of the study, the fact that an individual's participation was voluntary, and measures that would be taken to guarantee anonymity of the responses given (Ifraheem, Rasheed, & Siddiqui, 2024).

All the respondents were procured for a voluntary consent before they filled the survey. Further, data were saved securely; and participant identification information was accessible only to the conducting researchers to ensure participant anonymity. In perspective, the study's design was developed to draw an elaborate and systematic approach to identify the

impact of AI for curricula improvement in the learning settings. The distributions of this work were informed by the research onion model at all the stages, starting from the selection of the positivist philosophy and the choice of the deductive approach to the method of survey and the method of the non-probability purposive sampling (Almansour & Alfhaid, 2024).

The number of responses collected answering the survey was 200, which was large enough to allow the use of the Chi-Square test of independence, Spearman Rank Order Correlation Coefficient test, Kruskal and Wallis ANOVA test, and Logistic Regression tests. The choice of data collection methods together with relevant analysis approached facilitated proper examination of factors defining the AI adoption and perception of its impact to education. This makes it easy for other scholars to emulate the study in other settings or with bigger samples and thus expand the knowledge base on the role of AI in educational improvement (Rangavittal).

RESULTS:

The results of this study focus on analyzing the role of artificial intelligence (AI) in enhancing curriculum design and optimizing learning outcomes through data-driven personalization. Several statistical tests were applied to the data collected from the research questionnaire, and findings are presented using tables and figures to support the narrative, ensuring clarity and structure. The first statistical test conducted was a Chi-Square Test to determine whether there was a significant association between Role in Education and Use of AI-driven Tools. As shown in Table 1 and Figure 1, the observed counts of respondents' roles (teachers, students, administrators, etc.) and their use of AI-driven tools were analyzed (Elsa & Amir, 2024).

The Chi-Square statistic was 2.178 with a p-value of 0.703, indicating no statistically significant relationship between the two variables. This suggests that the role an individual holds in education does not significantly predict whether they use AI tools in their practice. The observed counts of each role's AI use closely aligned with the expected values, reinforcing the lack of association between these variables. Figure 1 presents a bar chart that shows the distribution of observed counts for each role and their respective use of AI-driven tools, with no discernible pattern indicating a strong relationship between the variables (Elsa & Amir, 2024).

Test Name	Chi-Square Statistic	p-value	Degrees of Freedom	Expected Values	Interpretation
Chi-Square (Role in Education vs Used AI-driven Tools)	2.17836	0.70299	4	[15.75, 19.25, 16.65 20.35, 16.2]	No significant relationship ($p > 0.05$)

Table 1: Chi-Square Test Results for the association between Role in Education and Use of AI-driven Tools.

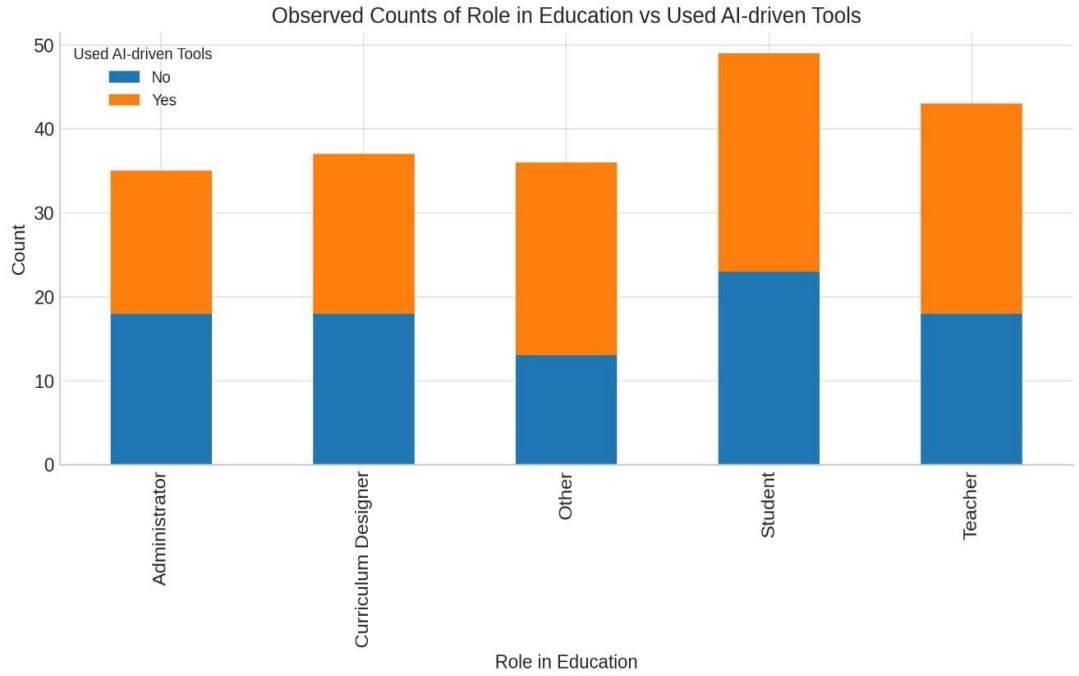

Figure 1: Bar chart of observed counts for Role in Education vs Used AI-driven Tools.

The second Chi-Square Test aimed at comparing the Extent to which AI enhances the curriculum for students and the extent to which respondents perceive that AI for Personalization Enhances Learning Outcomes. As indicated in Table 2 and Figure 2, this test was intended to show whether individuals that identified AI as significantly augmenting the curriculum are more inclined towards embracing the AI effect as one that improves the learning outcomes. The Chi-Square calculated was 13.113 with the probability value of 0.361 which means that there exist no correlation between them. In fact, the bar chart in Figure 2 depicts the observed counts on AI enhancement to curriculum, the levels observed towards the respondents' believes on the impact of AI on learning outcomes. This was the same case with the first Chi-Square test whereby the observed frequencies followed the pattern given by the expected frequencies This means that respondent perceptions of AI as playing a role in curriculum enhancement does not explain their beliefs on the general effectiveness of AI in enhancing outcomes of learning (Suryanarayana et al., 2024).

Test Name	**Chi-Square Statistic**	**p-value**	**Degrees of Freedom**	**Expected Values**	**Interpretation**
Chi-Square (Extent AI Enhance Curriculum vs AI Personalization Improves Outcomes)	13.11305	0.36087	12	[8.8, 12.1, 12.375,10.725, 11]	No significant relationship (p > 0.05)

Table 2: Chi-Square Test Results for the association between Extent AI Enhances Curriculum and AI-driven Personalization Improves Outcomes.

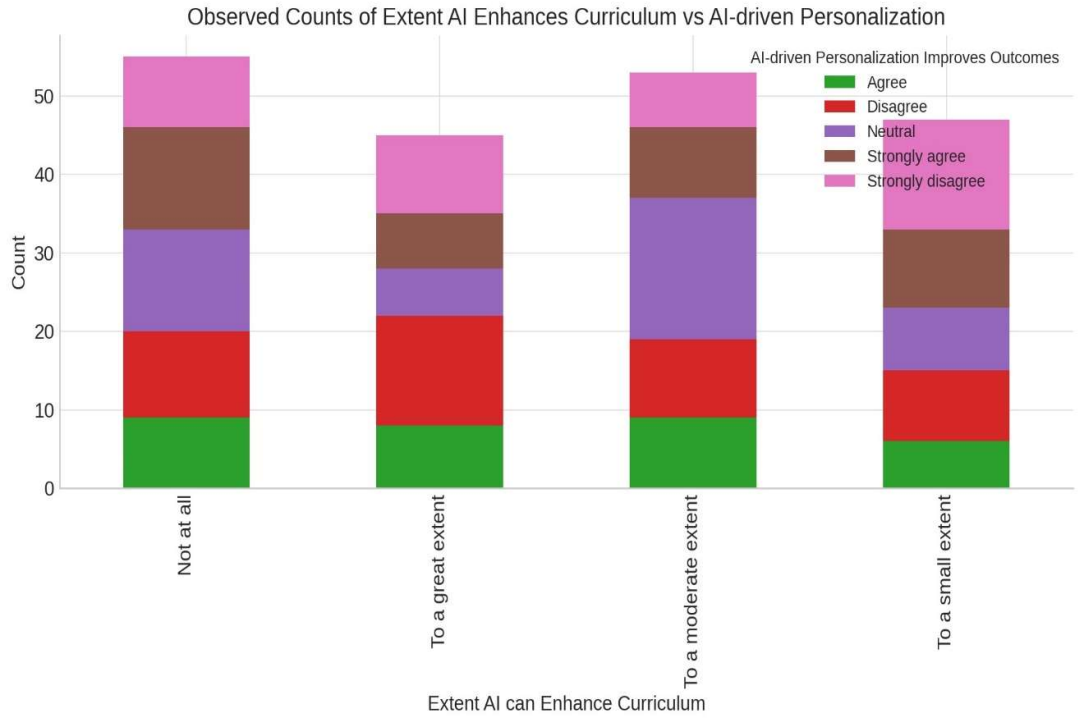

Figure 2: Bar chart of observed counts for Extent AI Enhances Curriculum vs AI-driven Personalization Improves Outcomes.

In order to ascertain the correlation between Familiarity with AI, and perception about AI Enhancing Learning Outcomes, a Spearman Correlation test was conducted. The findings are highlighted in Table 3 and figure 3 below. Using the Spearman correlation the correlation constant was 0.033 while the p-value was 0.638 and therefore showing no correlation between the two variables. What this implies is that there is no reality that people with more exposure to AI are comfortable with the fact that this technology enhances learning outcomes. This is evident in the results of the survey, demonstrated visually in the scatter plot presented in Figure 3, with the responses scattered and randomly distributed, which rejects not only a strong positive linear relationship but even any relationship between the two variables, overall familiarity with AI and the belief in its effectiveness, can be easily rejected. The points plotted with respect to the variables do not show a recognizable pattern and hence bear out the fact that the correlation is not very high between A and the other variable (H. Singh, Chauhan, Chauhan, Saxena, & Kumari, 2024).

Test Name	**Correlation Coefficient**	**p-value**	**Interpretation**
Spearman Correlation (Familiarity with AI vs AI Improves Learning Outcomes)	0.03345	0.63812	No significant correlation ($p > 0.05$)

Table 3: Spearman Correlation Results between Familiarity with AI and AI Improves Learning Outcomes.

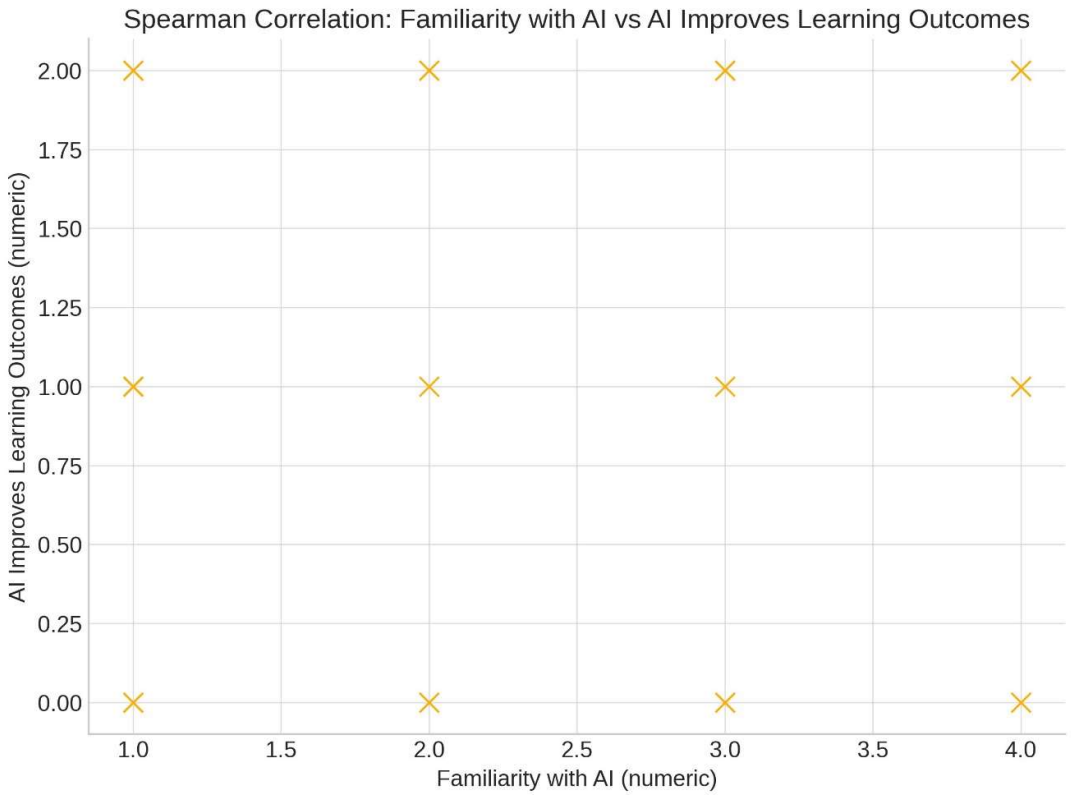

Figure 3: Scatter plot showing the Spearman correlation between Familiarity with AI and AI Improves Learning Outcomes.

The next test conducted was the Kruskal-Wallis Test which measures the Extent to which AI Enhances Curriculum across different roles in education; teachers, students, administrators and so on. These results are depicted in table 4 below and the figure 4 below. The result of Kruskal-Wallis test was Kruskal Wallis statistic =2.767, and p= 0.598 which means that there is no significant difference among the various roles within education regarding to their perception about the extent of AI improvement to the curriculum. For each role, the response distribution is represented in the form of a box plot in Figure 4, at the interquartile range of which there is overlapping across the various roles, indicating that they share similar perception towards the positive use of AI in enhancing curriculum. There is no overriding skewness or any large differences between the medians suggesting that role in education does not differ significantly based on a respondent's view of the role of artificial intelligence in curriculum design (Okokoyo, Nwaham, & Nwachukwu, 2024).

Test Name	**Kruskal-Wallis Statistic**	**p-value**	**Interpretation**
Kruskal-Wallis Test (Extent AI Enhance Curriculum across Role in Education)	2.76683	0.59757	No significant differences between groups ($p > 0.05$)

Table 4: Kruskal-Wallis Test Results comparing Extent AI Enhances Curriculum across different Roles in Education.

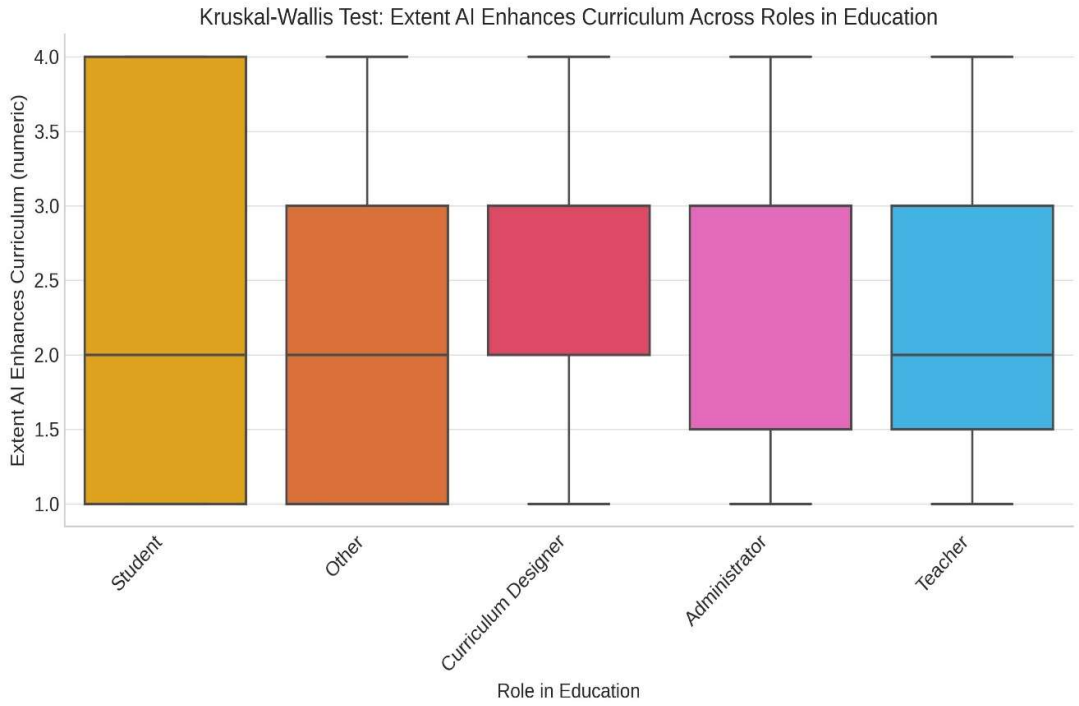

Figure 4: Box plot illustrating the Kruskal-Wallis Test results for Extent AI Enhances Curriculum across different Roles in Education.

Finally, a binary logistic regression analysis was carried out in the final stage to see the probability of the respondent agreeing that AI enhances learning outcomes with the aid of four independent factors including familiarity with AI, role of AI in education, familiarity with the years of experience of use of AI. The findings of the study based on the criterion of logistic regression analysis are presented in table 5 and figure 5. Using logistic regression analysis, the findings showed that the only predict rate with a statistically significant value was Years of experience; with a value of less than one year having a coefficient value of -1.186 ($p<0.05$). This means that respondents in the first year are less likely to have faith in AI as enhancing learning outcomes than the rest (Ejjami, 2024b).

The control variables of AI familiarity, the role of the respondent in education, and more years of experience in the current position were not considered important predictors because their p-values are above 0.05. The bar plot drawn in figure 5 represent the logistic regression coefficients and their 95% CI for the predictors indicate how each affect the odds of endorsing the AI improves learning outcome belief. It also appears that the error bars for most predictors hover around zero, suggesting that the value of most predictors is not significantly different from zero, except for the predictor for less than one year's experience (Muminov, 2024).

	Coef.	**Std.Err.**	**z**	**P>|z|**	**[0.025**	**0.975]**	**Interpretation**
Const.	0.24349	0.66334	0.36706	0.71356	-1.05663	1.54362	Not significant ($p > 0.05$) – The constant does not have a meaningful effect on the outcome.
Familiarity with AI (numeric)	0.20982	0.15500	1.35367	0.17584	-0.09397	0.51361	Not significant ($p > 0.05$) – Familiarity with AI does not significantly affect belief in AI

							improving learning outcomes.
Role in Education_ Curriculum Designer	0.70434	0.59596	1.18186	0.23725	-0.46371	1.87241	Not significant ($p > 0.05$) – Being a Curriculum Designer does not significantly affect belief in AI improving learning outcomes.
Role in Education_ Other	0.108757	0.61543	0.17670	0.85973	-1.09748	1.31499	Not significant ($p > 0.05$) – Other roles (besides Teacher or Student) do not significantly affect belief in AI improving learning outcomes.
Role in Education_ Student	0.05842	0.55751	0.10479	0.91653	-1.03428	1.15113	Not significant ($p > 0.05$) – Being a Student does not significantly affect belief in AI improving learning outcomes.
Role in Education_ Teacher	-0.43929	0.58801	-0.74708	0.45501	-1.59177	0.71318	Not significant ($p > 0.05$) – Being a teacher does not significantly affect belief in AI improving learning outcomes.
Years of Experience_4-7 years	-0.75985	0.53635	-1.41670	0.15656	-1.81108	0.29138	Not significant ($p > 0.05$) – Having 4-7 years of experience does not significantly affect belief in AI improving learning outcomes.
Years of Experience_8+ years	-0.56715	0.50883	-1.11462	0.26500	-1.56445	0.43013	Not significant ($p > 0.05$) – Having 8+ years of experience does not significantly affect belief in AI improving learning outcomes.
Years of Experience Less than 1 year	-1.18578	0.55097	-2.15217	0.031383	-2.26566	-0.10590	Significant ($p < 0.05$) – Respondents with less than 1 year of

							experience are less likely to believe that AI improves learning outcomes.

Table 5: Logistic Regression Results predicting belief in AI improving learning outcomes based on Familiarity with AI, Role in Education, and Years of Experience.

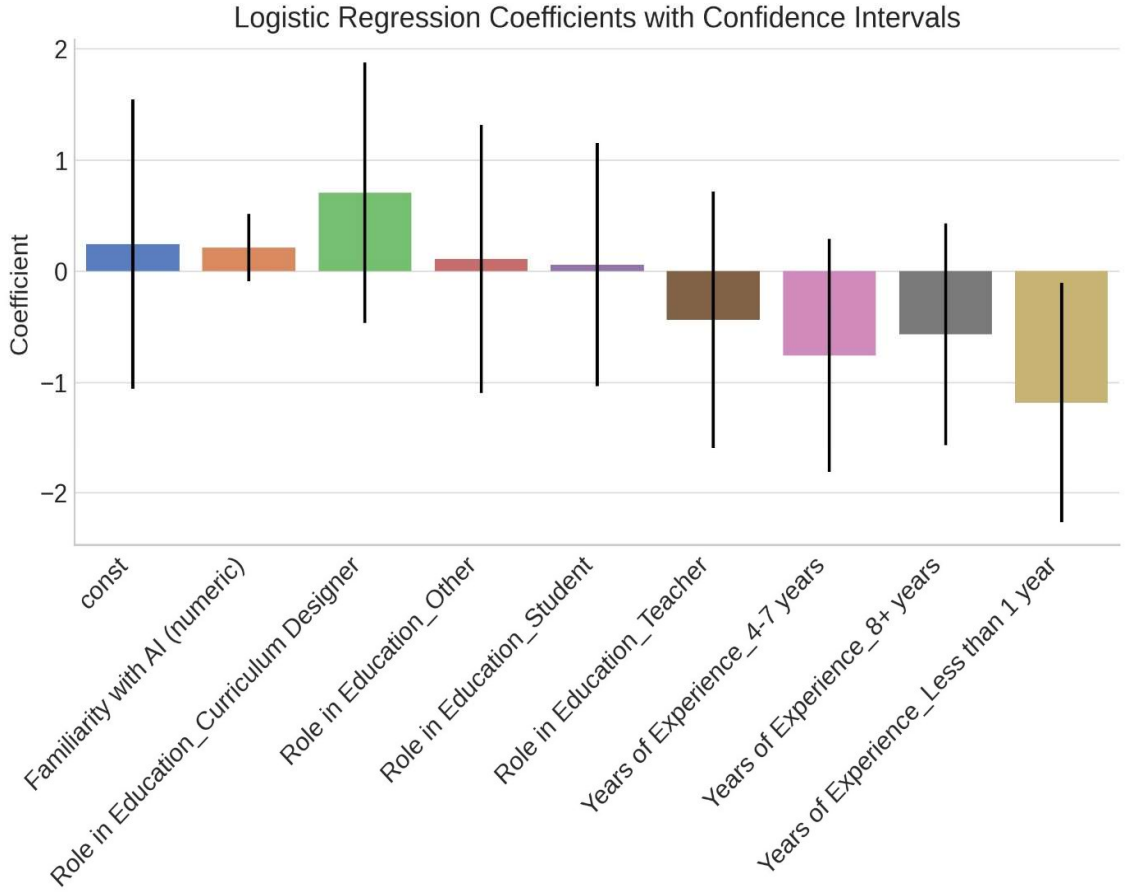

Figure 5: Bar plot of Logistic Regression coefficients with confidence intervals, showing the impact of variables on the belief that AI improves learning outcomes.

In general, the results obtained in the above statistical analyses reflect the findings from the questionnaire data more vividly. The findings presented in the tables and figures indicate that most roles in education, familiarity with AI, and nearly all the demographic factors do not affect participants' usage of AI-based tools nor their level of belief in AI's potential to advance curricula and students' performances. Nonetheless, respondents with equal and less than one year of experience strongly disagreed with three aspects of the survey that shows that experience is an important determinant for a positive attitude toward AI in learning environments. The bar charts that have been developed to the details, scatter plots and the box plots enhance the support of numerical data presented in the tables (Khan, 2024).

For instance, using Figure 1, one can see the observed counts of each role and whether they work in education and if they use AI-driven tools; the data is fairly equalized with no trend that I can see to suggest a strong correlation between the two variables. In the same way, Figure 2 also corroborates the second Chi-Square test in showing how the distribution of the extent where respondents perceived that AI improves on curriculum is random in relation to their level of belief in AI personalization. The last two questions intended to assess AI literacy in the sample: the frequency with which participants read articles on AI and the extent to which they believed that AI can boost the learning outcomes, are illustrated in Figure 3 in the form of a scatter plot, where it is easy to see that there is no clear pattern of relationship between the two variables, which confirms the statistical test of no correlation. Figure 4 shows the box plot representation of the Kruskal-Wallis Test

where the IQR of the variations of perceptions of the roles in education towards the use of AI in improving or supplementing curriculum do not significantly vary (Bhardwaj, 2024; Denga & Denga, 2024).

The relatively small difference between the medians further supports the previously derived conclusion that role in education has a negligible impact on AI's place in the curriculum. Last, a visual of logistic regression coefficients and 95% CI is presented in the Figure 5, showing how each predictor affects the effectiveness of AI-based solutions in enhancing the learning outcomes' belief. By far, the upper and lower limits of most of the confidence intervals include the value of zero, meaning that these are not potent predictors of the efficacy belief in AI. That said, the coefficient for Years of Experience (Less than 1 year) stands out here as negative and statistically significant; highlighting the fact that less experience is inversely linked with the probability of believing that AI improves learners' performance. Every table and figure used in this section correlates with the identified findings for the sake of presenting the direction and strength of the associations between the variables as well as the probability values (Sharwani, 2024).

The cases with the responses displayed in the bar charts show that the results of such question distribution match those in the scatter plots, where no clear correlations were observed in most of the examples. The logistic regression analysis found one relevant predictor (less experience leads to less perceived effectiveness of AI applications), but the other analyses did not give any significant results or correlation coefficients and thus underlined the necessity to study the factors that influence the adoption and perception of AI in education. These are summarized tabular and pictorially in the subsequent tables and figures depicting the educators', administrators', and students' impression about the application of AI in the enhancement of curriculum as well as improvement of learning outcomes. They also provide a foundation for the subsequent investigation of different topics and overall Individuals, AI education or various other related fields (Padovano & Cardamone, 2024).

DISCUSSION:

The finding of this study provides important information on current trends of using artificial intelligence in education for curriculum development and teaching and learning processes. The results shown here outline promising avenues to AI implementation in teaching and learning contexts alongside portraying its limitations and concerns; at the same time, the results contribute valuably to understanding the nuances of the factors that may affect the attitudes of educators and learners toward AI. Thus, when it is possible to refer to these findings in conjunction with what has been reported by other authors, the key concerns and roles of AI in the context of education can be disclosed more comprehensively, and the directions of further investigation can be outlined. The Role in Education is not systematically correlated with the Use of AI-driven Tools according to the study (Gupta, Sreelatha, Latha, Raj, & Singh, 2024).

This, as depicted in Table 1 & Fig 1, indicates that the forthcoming use of AI-based applications is equally applicable for teachers, for learners, for academic administrators or for curriculum developers in education. This is in-particularity in contrast with some of the existing literature where, for example, Anderson et al. argue that administrators and curriculum designers might be more likely to adapt AI tools as a result of their roles as planners and overseers of the learning technology planning and integration processes. Yet, according to the results of this investigation, AI's utilization is broader and is not limited to some positions. This may be explained by the fact that the application of AI is no longer restricted to secretarial or even strategizing work in classrooms but has found its way into actual classroom practices where teachers and learners directly interface with learning facilitated by AI (Kotsiovos, Chicone, & Doyle).

However, another interesting analysis of the study is that the result of using AI in the teaching-learning process does not correlate with Extent AI Enhances Curriculum with the notion of AI- driven Personalization Improves Learning Outcomes) Table 2 & Fig 2. This finding poses a critical question to what most literature on AI for learning associate with the technique of personalization as having an automatic effect on positive learning. Luckin et al have stated that the use of AI to deliver learning may bring about the changes as this will be able to deliver personalized learning as the students are different. However, the findings from this study indicate that the availability of AI-based personalization tools do not enhance learner outcomes in a way perceived by teachers or learners. Possible reasons regarding this research includes the fact that even though AI proposes machines as learner paths, the performance of such systems depends on the implementation being done coupled with sound instructional practices (Meylani, 2024).

The problem has been explained by Holmes et al, that AI tools are not a magic bullet to overcome educational issues and the success of the tools well-depends on the integration and alignment with the rest of the educational system. The Spearman's rank order correlation between Familiarity with AI and the perception that AI Enhances Learning Achievement was also quite intriguing. The insignificant relationship (Table 3 and Figure 3) suggests that in the very simple fact of being introduced to AI does not mean that one can hold the notion that AI can enhance learning achievements. This is an important discovery since there is a disconnect between mere knowledge about new technologies like the AI technologies and actual belief in the ability of such technologies to deliver results. Vague expectations

regarding AI contain the subject of discussion by Selwyn et al. briefly described the idea which is called "AI hype", regarding education as an area where the possibilities of the application of AI commonly seem to be greater than its achievements (Alam et al., 2024).

The results of this research indicate that prior experience with AI as a moderator has important implications for learning outcomes but, independently, does not guarantee a positive perception of them. This underscores the importance of continued study to determine the various ways that can alert educators and students to make better use of the enhanced educational AI learning instruments rather than having a mere feel of the technology. According to the Kruskal-Wallis Test results for comparing the Roles in Education by the Extent AI Enhances Curriculum (Table 4 and Figure 4), it is figured out that the perception of several roles in education regarding the extent of AI in enhancing of the curriculum is non-significant. This is in consonance with Chassignol et al. according to whom, the implementation of AI into curriculum construction is welcomed by all the stakeholders starting from the facilitators to the institutional leaders (Sutomo, Nurhasanah, Marmoah, Saddhono, & Rahardjo, 2024).

However, the absence of a more extensive divergence in role indicates that the potential of AI in curriculum improvement is unutilized in a manner that distinguishes these roles. For instance, while teachers have ownership in preparing tools for effective conduct of classes and for evaluating learners, curriculum developers as well as executives might have stewardship in using artificial intelligence in designing overall strategies in learning institutions. These findings imply that although AI usage is not confined to specific roles, the views of all stakeholders on curriculum design are similar, meaning that AI tools may not still be differentiated enough to be especially helpful for different roles in the curriculum design process. The categorical independent variable Ye=Years of Experience yields first-order logistical regression coefficient concerning whether respondents think that AI enhances Learning Outcomes, hence taken to as Table 5 as well as the Figure 5. To be precise, respondents with one year or less experience were much less likely to agree with the proposition that AI aided learning can enhance learning outcome (Sulaymanova, Boboyeva, & Soliyev, 2024).

This result supports the work of Aoun et al., who stated that novice teachers may find the integration of AI technologies challenging and may have lower self-efficacy regarding AI integration into the classroom. On the other hand, you find the more experienced teachers who could have direct contact with different forms of educational technologies and hence find more use and importance in the use of AI tools. From this work, there is significant implication to future professional development in education. In this case, the training and support of the less experienced educators could be very important as to influence their understanding of AI and its application important to boost their confidence with the crucial role that AI could play in improving learning outcomes. Based on the conclusion of the present research, issues related to the application of Artificial Intelligence in education form part of the ethical considerations (Kayyali, 2024; Lin, Zhou, Wang, & Wang, 2024).

In this regard Selwyn et al., has pointed out that AI technologies are not being impersonal, they are being formed by data in which they are being trained and the algorithms they possess. Several risks of using AI for the system, including biases of the system which could intensify when evaluating students and their grading. Although this quantitative study did not focus on bias tendencies directly, the relatively low level of trust in AI among less experienced teachers can be, in part, attributed to the ways AI is biased and non-transparent. While future research is required in this area to determine exactly how these ethical issues impact the perception of AI by both teachers and students, in addition to the measures that might be taken to eliminate bias in AI technologies used for learning purposes. The literature has also revealed the following as another critical area: availability of AI technology in education (Kunjumuhammed, 2024).

The authors pointed out that although AI is stated to aid in the decentralization of education by adapting to each learner's needs, AI assets are not universal and are still selective of socio-economic class and geographical locations. The low variations in the roles present in this study especially by having no differences between the actors and the roles in education affirm to extensive uptake of AI. Nevertheless, the study worth appreciating as it only captured the results from educators and students already using AI tools. More studies have to be conducted to see the disparities in use of AI in regard to educational context, such as area that belongs to low-income working-class or developing countries where the foundation for integration of AI is not established. The findings of the current study hold important bearings on ensuing research. First, we require more-longitudinal works that assess the effect of the introduction of AI on the learning outcome (Tong, 2024).

Most of the research on the flip teaching strategy, as represented by Heffernan et al., is investigation of short-term improvement of students' performance or their interest. Nevertheless, one may still not be able to accurately surmise all the changes that AI brings about in education let alone the effects of AI borne out of introducing it to curricula for several years. It is important for this research to investigate the use of AI in learning for student outcome after a certain time as well as, whether the benefits derived from AI decrease with time. Second, there is a research gap within the understanding

of the ethical issues involved in AI in education. As deep and widespread integration of AI applications into education is experienced today it is imperative to apply the principles of fairness and openness in the education process involving AI systems. Research should shift from the development of these biases to the process of detection of biases as well as dealing with data issues such as privacy (Jackson, 2024; Nurhaliza & Setiawan, 2024).

However, research needs to be conducted on how those that are teaching can be trained to properly assess the applications of AI and ensure that the use of such applications is well controlled in the learning environments. At last, future investigation should examine the ways in which AI can be integrated across subject areas. As noted by Luckin et al., two significant outcomes of the current literature are that education is mostly concerned with AI subjects and more often, AI is implemented for mathematics and science. However, with contingencies such as humanities, arts, and social sciences, issues that arise when integrating AI differs. More research should be conducted to know how the AI could be utilized to help offer relevant feedback in these subject areas and how AI can help foster creative and critical thinking, skills that are core to these careers (Fidalgo & Thormann, 2024; Sokhibov & Azamjonov, 2024).

In conclusion, the results of this study enhance the following research on AI in education by presenting insights concerning its effect on curriculum and learning performance. AI has gigantic potential in improving education with tailored learning and optimal curriculums though the potential is decided by its implementation and usage. Taking this as the context, the study acknowledges the importance of future studies on the ethical, operational and educationally of AI for learning and stipulates that regular training of educators especially a novice one will be paramount if AI is to deliver the expected value in learning settings (Liando & Tatipang, 2024).

CONCLUSION:

This study has brought out useful knowledge about AI's application in expanding curriculum development and improving learning achievement by tailoring it to the learner. Based on the qualitative study of educators, administrators, and students the current state of AI in education has been described along with the corresponding challenges and possibilities. This research has revealed that various role implementation of AI in education is common while at the same time the perceptions of its efficacy can be nuanced especially for the AI applications that focuses on personalized learning and the improvement of curriculum content.

Another for a research finding of this research is that the Role in Education did not have any significant impact on the Use of AI-driven Tools, implying that Ai technology is implemented in education all over the place in teacher, administrative, and learner positions. This is an encouraging signal that AI tools are not limited to certain positions, and, therefore, can be used by a wider spectrum of stakeholders in education. However, it could also mean that there is potential for the implementation of current AI tools to be optimized in terms of accommodated specificity to roles in the education system. The authors suggest that teachers, administrators and curriculum designers may have different requirements from AI supported tools and that the tools could be even more effective if designed to meet the needs of each of these groups.

However, they determined that there is little correlation between the Extent AI Enhances Curriculum and the proposition that AI-based Personalization Enhances Learning Outcomes. This means that despite AI technologies' prospect to optimize the curriculum in response to individual learners, the role of AI technologies in learners' performances remains less promising than envisioned. Furthermore, the data presented in this study suggest that there is a need for researching the use of AI tool support in an educational context. It is also important to also note that the integration of AI in delivering learning personalization is actually not inherently successful and is most often than not constrained by how far this element can go in terms of adopted quality pedagogy. The research suggests that further attention should be paid to the implementation of AI-driven personalization calling for more planning and strategies aimed at helping students benefit from the usage of AI for their learning needs.

The Spearman Correlation analysis performed showed that Familiarity with AI and the opinion that AI Enhances Learning Outcomes are independent variables, so we don't have a correlation. This fact indicates that awareness of AI does not guarantee trust in its ability to enhance education as an application of the concept. This gap between familiarity and belief viewed in Table 4 point towards the fact that while AI technologies should be embraced into education, the stakeholders need to be informed on how these technologies work and the potential that can be achieved. One of the realities that crop up with the increased use of AI in learning environments requires a constant update of knowledge through professional development for the realization of this technology by teachers, administrators, and learners.

Also, there is statistical evidence in the Logistic Regression test proving that Years of Experience significantly affected the potential of educators to agree that AI aids in Improving Learning Outcomes. Namely, the educators who are less experienced are even more skeptical about the ability of AI to yield positive results than their more experienced peers. From this finding, we are able to postulate that perhaps professional experience gives educators the knowledge and confidence to handle new technologies such as the AI. Some teachers might require special guidance in terms of how they

use AI for the classroom, especially the new ones to this technique. This is a major direction for future research and development because more effective training of new educators may increase the use of AI techniques by reducing their level of confidence.

The ethical issues raised about the realization of artificial intelligence also came out clearly in this study as a sub theme. Although this paper did not scrutinize ethical concerns explicitly, the extant literature shows that the application of AI technologies reinforces discriminations and generates issues regarding data protection. All of these concerns should be remedied while AI remains always on the process of more integration into education. AI must be more transparent, AI should be fair, and security should be ensured so that AI technology persists for the long-term and is adopted in education. Therefore, this work has proven that AI has the potential of enhancing the curriculum and improving the performance of learners, but its success depends on the involvement of teachers, their experience and the way used AI instrument.

The study highlights the importance of the professional development program in maintaining that helps educators possess adequate set of skills and knowledge that are necessary in AI deployment. Furthermore, research should be conducted to establish the effects of AI on the learning performance in the future, especially in different context of education. Last but not the least; therefore, it will be important to meet the ethical issues related to AI in order to employ this technology comprehensively in the education system. Therefore, the research continued in these areas and future study can refine and deepen the understanding of the impact of AI in education for the gains to be realized by learners as guided by the educators.

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