






## Artificial Intelligence and Curriculum Prospects for Elementary School

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### ABSTRACT

The research aims to investigate Artificial Intelligence (AI) and curriculum prospects for elementary school education. The study focused on identifying specific areas within curriculum where AI can be incorporated and assessed the prospects of AI which may enhance learning experiences for elementary school students. Descriptive research design was used. Quantitative approach adopted for data collection. There were 70 participants including school leadership and teachers from elementary schools by using convenient sampling. AI and curriculum are interdependent variables. The study showed that the broad thoughtful opportunities and challenges associated with AI in elementary education. Results of the depicted that majority of the respondents agreed with the idea of introducing AI into curriculum which is helpful for the literacy of AI education. Results reflected that curriculum modification are needed continuously according to need of modern era. AI can monitor the usefulness of curriculum and identify specific areas. AI made a significant addition in optimization of contents, teaching methods and facilitates multimodal teaching style to increase the creativity, and innovation and problem solving skills. AI education in elementary school curriculum can better train students for 21st century and increase job opportunities for students through AI and technology integration in education.

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## 1. Introduction

AI is the field of computing and programming that revolutionize in world through supporting modern and advance concept in all aspects and sectors of life and also support diverse perspective. AI refers to the simulation of human intelligence in the machine enabling them to perform tasks that usually require human intelligence such as problem solving, learning, understanding natural languages, and making decisions. AI is a branch of computer science that combines machine learning, algorithm development, and natural language processing (Jiahong Su, 2022). AI education is the most demanding field of technology that is used to facilitate the human beings. AI educational system is foremost to meet the needs of future and to compete with the modern world and make humans' life more comfortable and profit making. All developed countries emphasizes on the AI education even at kindergarten level to higher education system because of the awareness about the AI. A "school curriculum" refers to all experiences which are planned and guided by teachers, and learned by students, whether it is implemented inside or outside the classroom (Chiu et al., 2021). Curriculum plays the significant role in education system which instruct policy makers, educators and learners to promotes the expected behaviors in generations. Curriculum encounters unexpected behaviors and activities generation to generations.

Curriculum includes aims, goals, objectives contents, syllabus, curricular and co-curricular activities. Policymakers, Curriculum developers, and schools administration plays vital role in order to slot in the effective and efficient learners to enhance AI education. The

integrations of AI to curriculum is the need for promotion of AI education in students. AI based education system and integration of technology and designing of AI based curriculum enables the education system flexible and results oriented. AI and curriculum integrations take place through defining the objectives of indulging knowledge of AI, integrated curriculum contents development and implementations of AI based curriculum at elementary schools, problem solving methods of teaching, applications of AI tools and innovative strategies.

AI has potential to meet the future need of education system. The integration of AI into education system through adaptation of AI based curriculum in elementary school education. Curriculum plays vital role in order to produce productive and efficient learners and to modify the behavior of the learner. The case study of AI and curriculum integration through mixed method approach provide us the practical insight into how AI technologies can effectively and efficiently applied to elementary school setting. We explore the prospects of AI based approach and AI integrated curriculum implications and implementing strategies and ways to govern AI set up in education system through following steps of awareness, initiative, provision of incentive and facilitation in school and following revolution of AI and all other technologies through involving integrated education and application of technology (Jiahong Su, 2022). Erica Southgate (August 2019) for the kindergarten to higher education and modification of curriculum by the aspects of AI and ICT.

### **1.1. Problem Statement**

The world is mounting swiftly and following the technological revolution to convene the future need of world. The world working on 21<sup>st</sup> century skills and corporate technology in education and all others fields'. Our education system is traditional and outdated and lacking in integrated curriculum, integrated methodologies, problem solving approach and technological tools in education sectors. Develop countries are working on AI education and multiple AI based technology implication in education system and application of robotics in Education, Health-care, manufacturing industries etc. In world developed countries are working on online education system and fostering technology in education sector. We need to adopt the AI education to cope with future needs, challenges and to encounter outdated and traditional educational narratives. There is intensive need of AI education and research to make our education system more effective, efficient and result oriented. There is need of AI in education sector to modify and transforms younger generation towards personalized learning, critical and analytical skills development through the integration of AI in curriculum setting.

### **1.2. Objectives**

1. To asses prospects of AI into curriculum of elementary school.
2. To explore the integration of AI in curriculum

### **1.3. Research Questions**

1. How we can integrate AI in curriculum?
2. What is the need of AI into curriculum?

## **2. Literature Review**

### **2.1. Artificial Intelligence**

AI is the field of computing and programming that transform. AI is the process of human intelligence in the machine enabling them to perform tasks that usually require human intelligence such as problem solving, learning, understanding natural languages, and making decisions. AI has its roots in ancient philosophy and mythology, but the modern history began in the mid-20<sup>th</sup> century. In 1950, Alan Turing proposed the Turing Test as a measure of machine learning. The term AI was coined by John McCarthy in 1956 during the Dartmouth Conference marking birth of AI as field of study. Early AI research focused on symbolic reasoning and problem solving like Marvin Minsky and Seymour Papert worked on preceptorons and early neural networks. The work on AI was slowed in 1980s due to challenges in AI complexity and computational power limitations. The late 20<sup>th</sup> century saw reappearance with advancements in machine learning, expert systems, and natural language processing. The 21<sup>st</sup> century witnessed breakthroughs in machine learning, particularly with the rise of deep learning. In 2011, IBM's Watson won Jeopardy!, demonstrating AI's ability to process vast amounts of information. Subsequent years saw considerable progress in image recognition, language translations, and autonomous vehicles. AI technology has a long history and is

constantly continuing to evolve indicated that since the innovation of computing and information processing techniques, AI has been widely used in education as it opens new possibilities, and challenges in educational practices confirmed that AI technologies impact teaching and learning, both positively and negatively, in the education industry.

The world is mounting rapidly and follows the technological revolution to assemble the future need of world. The world working on 21<sup>st</sup> century skills and corporate technology in education and all others fields' In the recent literature, we can find abundant studies that deal with the training and improvement of early childhood and primary school teachers in ICT and highlight the importance of teacher training to overcome the educational challenges of a new digitized society all of which stress the need to promote correct initial training of students and teachers Bezanilla (27 Aug 2021). AI(AI) education is becoming an increasingly popular subject in the eyes of educators due to the rapid integration of AI technologies in user-facing services and products. Researchers have called for formal K-12 education to prioritize AI literacy and teach children to interact with AI using critical lens (Van Brummelen & Lin, 2020). The uses of AI in education have been developing for decades. Moreno-Guerrero, Rodríguez-Jiménez, Gómez-García, and Ramos Navas-Parejo (2020) describe the trends in the study of AI in education between 1956 and 2019 based on a Biblio-metric analysis, concluding that while early studies centered more on technological process, more recent investigations focus on the development of AI as situated in pedagogical process.

The recent advances in AI are expected to have perceptive impacts on future labor markets and competence requirements, as well as enabling new ways of learning and teaching. According to the research and review studies, AI can be used in education to support various functions such as student self-regulation, motivation and well-being, personalized learning support and feedback, learning process support, assessment and evaluation, profiling and prediction, usability and accessibility, resourcing, and competence management AI(AI) applications in education are on the rise and have acknowledged a lot of concentration in the last couple of years (Yang, 2022). There is need of AI in education sector to adapt and transforms younger generation towards personalized learning, critical and analytical skills development through the integration of AI in curriculum setting. Integration of AI in Elementary schools curriculum can enhance student's problem solving skills. AI into curriculum is essential for Elementary school level, Balancing traditional subjects with AI education is essential for a well-rounded curriculum and Integrating AI into curriculum enhances student's critical thinking skills. Integration of AI concepts into curriculum can better equip students to understand technology, Integration of AI concepts into curriculum can better equip students to interact with technology at elementary school level and integrating AI in education can empower students to become more confident in using technology. AI education in elementary school curriculum can better train students for the challenges of 21<sup>st</sup> century.

AI can identify emerging skills demands in job market help to shape curricula to better prepare students for future work, AI education prepares students for future job opportunities, AI education tools foster innovation in young learners, and AI can make learning more engaging for each student. AI can make assessment process easy, AI -Powered assessment tool can provide real time feedback to students, enabling them to trap their progress make necessary adjustment to learning approach, AI education can increase the effectiveness of evaluation process, and AI in the curriculum can help to connect the gap between theoretical knowledge and real world application (Bae, Yoo, Yu, & Kim, 2021). Education play vital role in different attributes of life. Here are some key attributes of education in detail: Education and AI imparts knowledge and equips learners with various skills, such as critical thinking, problem-solving, communication, and technical abilities. These capabilities empower individuals to succeed in their personal and professional lives. Education and AI foster personal growth by promoting qualities like self-discipline, resilience, empathy, and self-awareness. It helps individuals understand their strengths and weaknesses, enabling them to continuously improve. Education and AI play a crucial role in economic development by preparing individuals for the workforce and entrepreneurship. It enhances their employability and opens doors to economic opportunities. Innovation and Progress: Education and AI foster creativity and innovation, driving advancements in various fields. It empowers individuals to think critically, develop new ideas, and contribute to societal progress. AI promotes health literacy and awareness, leading to healthier lifestyle choices and disease prevention. It also addresses mental health concerns and supports overall well-being. Sustainable Development: Education and AI play a vital role in

raising awareness about sustainability and environmental conservation. It prepares future generations to tackle global challenges and work towards a sustainable future. Lifelong Learning: Education and AI instills the value of continuous learning, encouraging individuals to stay curious and adapt to changing circumstances throughout their lives.

### 3. Methodology

This study is descriptive in nature. The data were collected through self-developed questionnaire. Questionnaire was designed as per the need of the study. The objectives of the study were specific and study planned to conduct in Azad Jammu & Kashmir. Moreover, it is important to mention that this research study is extracted from a thesis of B.Ed (Hons). So due to time limitation and challenges of other resources, this method adopted. Self-developed questionnaire converted into Google form. This form shared with teachers and schools leadership of public and private schools of elementary level from Haveli Kahuta, Mirpur, Bagh and Rawalakot. Collected data were interpreted for analysis purpose. The focus of the study was to investigate AI and curriculum prospects for elementary school education. Case study of AI and curriculum prospects was taken independent variables and elementary school level in Haveli Kahuta, Muzaffarabad Mirpur, Bagh, and Rawalakot was treated as dependent variables.

#### 3.1. Population

Population of study consisted of elementary school teachers and schools leadership of public and private schools for the scholastic year 2023. The selected district were Mirpur, Haveli Kahuta, and Bagh. The two districts were located to nearby of researcher residence. Time limitation was an important challenge to collect the data. Additionally, Mirpur district added in the population which is in Mirpur division. However, it was convenient for the researchers to collect data from this district. To avoid any biases, researcher involved the teachers and principals/other leaderships of institutions to verify the responses.

#### 3.2. Sample

The sample of the study comprises of 15 elementary schools selected by using convenient sample technique. 55 teachers and 15 school leaderships (heads, principals) of schools were selected as sample from 15 elementary schools.

#### 3.3. Research Tool

Self-developed questionnaire was used for data collection. 30 close ended items were used.

#### 3.4. Data Collection

Data was collected from the teachers and school leaderships of district Rawalakot, Muzaffarabad, Mirpur and Bagh AJK through online Google form which was shared to the teachers and school leaderships of public and private schools. We were received filled close ended items. We collected data from District Haveli AJK through personal visit to schools.

### 4. Results

Statement 1: AI is significant emerging concept in Education.

Statement 2: AI incorporates technological revolution in different fields including education.

Statement 3: AI in curriculum has the potential to revolutionize the field of education making learning more personalized.

Statement 4: Introducing AI into curriculum is essential for Elementary school level.

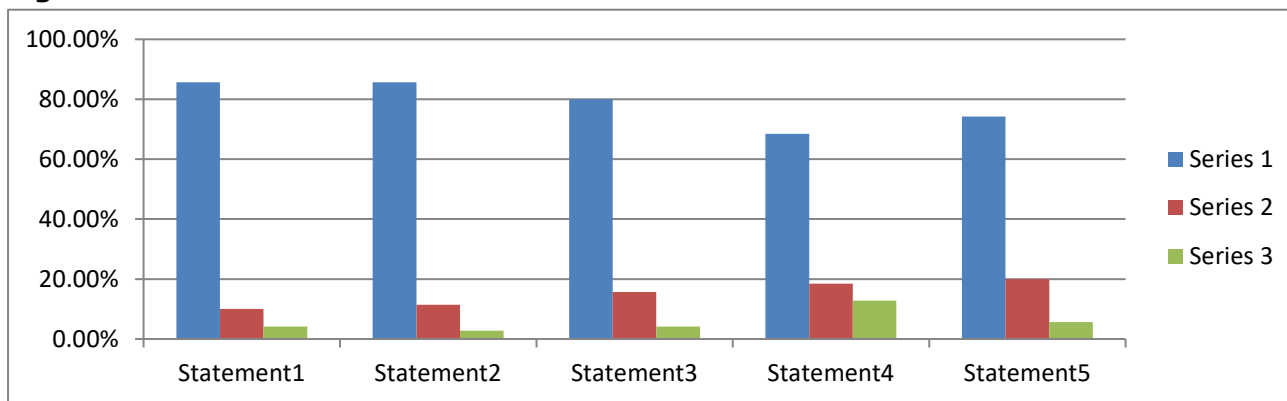
Statement 5: *Balancing traditional subjects with AI education is essential for a well-rounded curriculum*

**Figure 1**

Agree	Neutral	Disagree
S 1: Frequency 60 Percentage 85.7%	07 10%	03 4.2%
S 2: Frequency 60 Percentage 85.7%	08 11.4%	02 2.8%
S 3: Frequency 56 Percentage 80%	11 15.7%	03 4.2%
S 4: Frequency 48	13	09

Percentage 68.5%	18.5%	12.8%
S 5: Frequency 52	14	04
Percentage 74.2%	20%	5.7%

**Figure 1**



S 6: Integrating AI into curriculum enhances student’s critical thinking skills.

S 7: Integration of AI concepts into curriculum can better equip students to understand technology.

S 8: Integration of AI concepts into curriculum can better equip students to interact with technology at elementary school level.

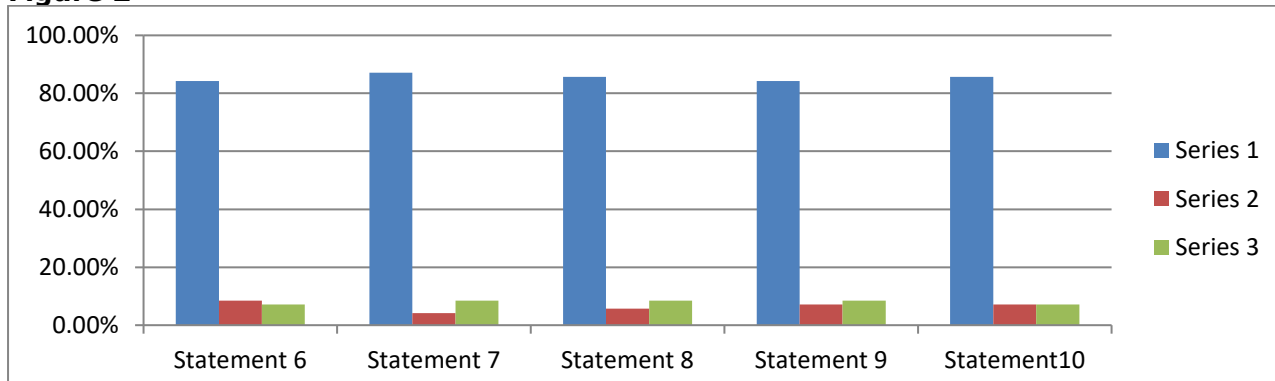
S 9: Integrating AI in education can empower students to become more confident in using technology.

S 10: AI education in elementary school curriculum can better train students for the challenges of 21<sup>st</sup> century.

**Table 2**

Agree	Neutral	Disagree
S 6: Frequency 59	06	05
Percentage 84.2%	8.5%	7.1%
S 7: Frequency 61	03	06
Percentage 87.1%	4.2%	8.5%
S 8: Frequency 60	04	06
Percentage 85.7%	5.7%	8.5%
S 9: Frequency 59	05	06
Percentage 84.2%	7.1%	8.5%
S 10: Frequency 60	05	05
Percentage 85.7%	7.1%	7.1%

**Figure 2**



S11: Integrating AI in the curriculum can foster creativity.

S12: Integration of AI in Elementary schools curriculum can enhance students’ problem solving skills.

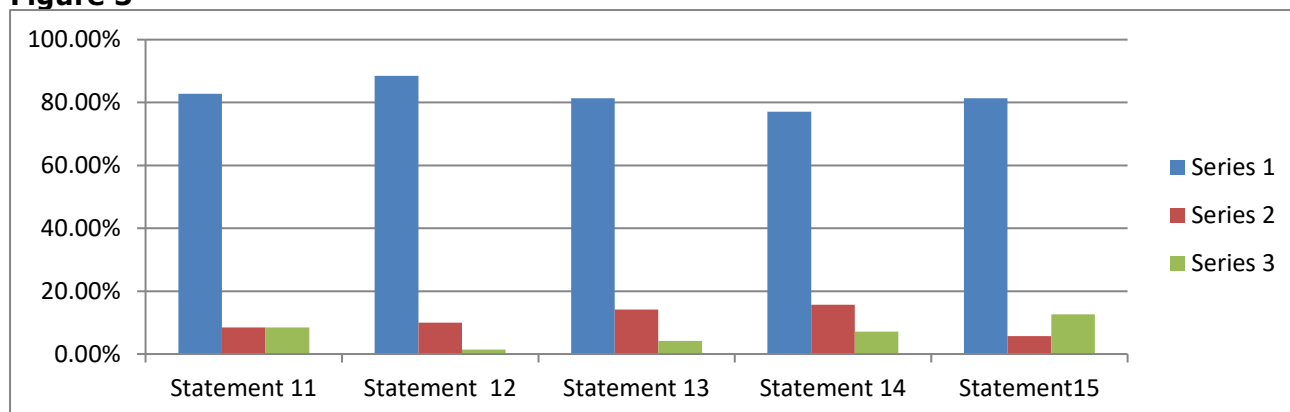
S13: Integration of AI in curriculum can enhance effectiveness of learning process.

S14: Integrating AI into elementary school curriculum can improve students’ engagement interest in learning.

S15: AI integration increases the accuracy of every process where it involves.

**Table 3**

<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>
S 11: Frequency 58 Percentage 82.8%	06 8.5%	06 8.5%
S 12: Frequency 62 Percentage 88.5%	07 10%	01 1.4%
S 13: Frequency 57 Percentage 81.4%	10 14.2%	03 4.2%
S 14: Frequency 54 Percentage 77.1%	11 15.7%	05 7.1%
S 15: Frequency 57 Percentage 81.4%	04 5.7%	09 12.6%

**Figure 3**

S 16: AI base curriculum boosts creativity of individuals.

S 17: Integration of AI in curriculum can enhance collaboration among elementary school students.

S 18: AI can facilitate multimodal learning experiences through incorporating various form of content into curriculum.

S 19: AI can identify emerging skills demands in job market help to shape curricula to better prepare students for future work

S 20: AI education prepares students for future job opportunities.

**Table 4**

<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>
S 16: Frequency 56 Percentage 80%	08 11.4%	06 8.5%
S 17: Frequency 59 Percentage 83%	08 11.4%	03 4.2%
S 18: Frequency 56 Percentage 78.8%	11 15.7%	03 4.2%
S 19: Frequency 55 Percentage 78.5%	09 12.8%	06 8.5%
S 20: Frequency 61 Percentage 87.1%	07 10%	02 2.8%

S 21: AI education tools foster innovation in young learners.

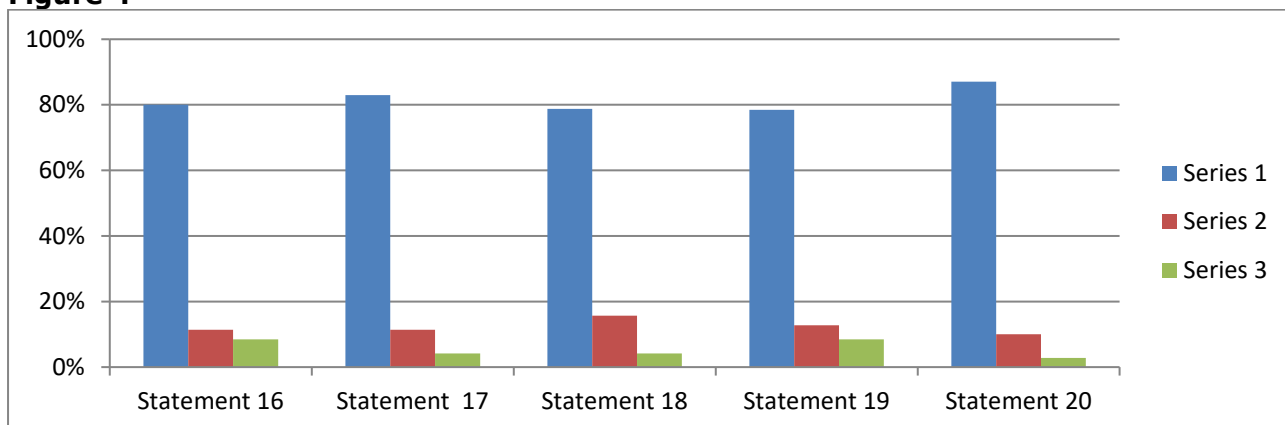
S 22: AI can make learning more engaging for each student.

S 23: AI can make assessment process easy.

S 24: AI -Powered assessment tool can provide real time feedback to students, enabling them to trap their progress make necessary adjustment to learning approach.

S 25: AI education can increase the effectiveness of evaluation process.

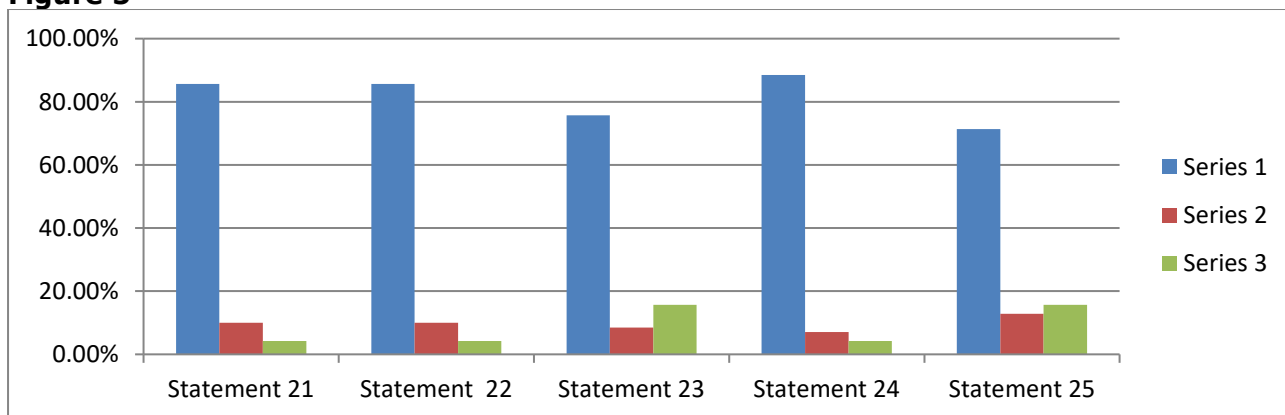
**Figure 4**



**Table 5**

Agree	Neutral	Disagree
S 21: Frequency 60 Percentage 85.7%	07 10%	03 4.2%
S 22: Frequency 60 Percentage 85.7%	07 10%	03 4.2%
S 23: Frequency 53 Percentage 75.7%	06 8.5%	11 15.7%
S 24: Frequency 62 Percentage 88.5%	05 7.1%	03 4.2%
S 25: Frequency 50 Percentage 71.4%	09 12.8%	11 15.7%

**Figure 5**



S 26: AI reduces human interaction.

S 27: Incorporating AI in the curriculum can help to connect the gap between theoretical knowledge and real world application.

S 28: AI can monitor the usefulness of the curriculum identify the areas for improvements.

S 29: AI can monitor educators to refine optimize the content teaching methods continually.

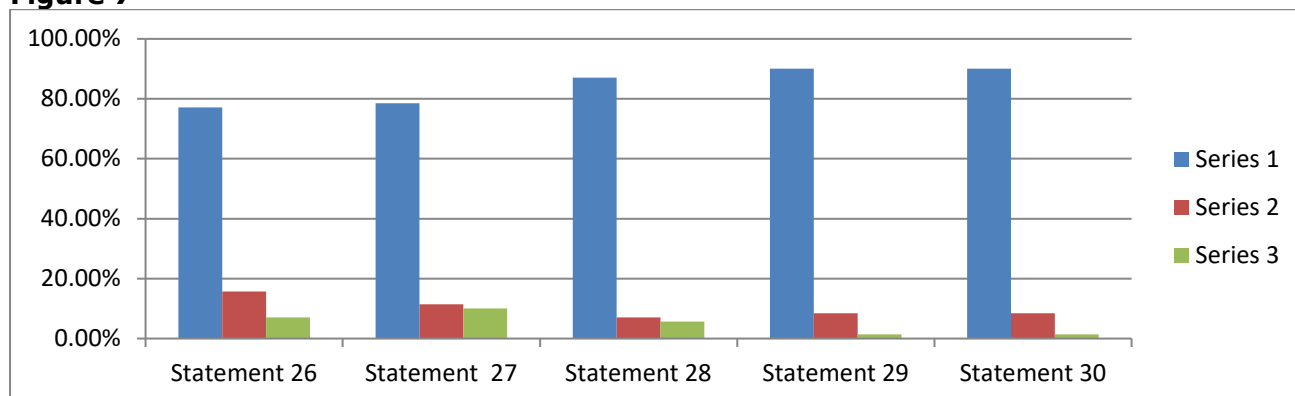
S 30: There is need to incorporate AI into the elementary school and curriculum.

**Table 6**

Agree	Neutral	Disagree
S 26: Frequency 54 Percentage 77.1%	11 15.7%	05 7.1%
S 27: Frequency 55 Percentage 78.5%	08 11.4%	07 10%
S 28: Frequency 61 Percentage 87.1%	05 7.1%	04 5.7%
S 29: Frequency 63 Percentage 90%	06 8.5%	01 1.4%

S 30: Frequency 63	06	01
Percentage 90%	8.5%	1.4%

**Figure 7**



## 5. Findings

1. Majority of the respondents agreed with AI is significant emerging concept in Education, AI incorporates technological revolution in different fields including education and AI in curriculum has the potential to revolutionize the field of education making learning more personalized. Additionally, few did not agree with these statements.
2. Most of the respondents agreed with Introducing AI into curriculum is essential for Elementary school level, Balancing traditional subjects with AI education is essential for a well-rounded curriculum and Integrating AI into curriculum enhances student's critical thinking skills.
3. Generally the respondents agreed with Integration of AI concepts into curriculum can better equip students to understand technology, Integration of AI concepts into curriculum can better equip students to interact with technology at elementary school level and integrating AI in education can empower students to become more confident in using technology. AI education in elementary school curriculum can better train students for the challenges of 21<sup>st</sup> century.
4. Majority of the respondents agreed with Integrating AI in the curriculum can foster creativity, Integration of AI in Elementary schools curriculum can enhance students' problem solving skills, Integration of AI in curriculum can enhance effectiveness of learning process Furthermore and Integrating AI into elementary school curriculum can improve students' engagement interest in learning.
5. Most of the respondents agreed with AI integration increase the accuracy of every process where it involves, AI base curriculum boost creativity of individuals, Integration of AI in curriculum can enhance collaboration among elementary school students and AI can facilitate multimodal learning experiences through incorporating various form of content into curriculum.
6. Majority of the respondents agreed with AI can identify emerging skills demands in job market help to shape curricula to better prepare students for future work, AI education prepares students for future job opportunities, AI education tools foster innovation in young learners, and AI can make learning more engaging for each student.
7. Majority of the respondents believed AI can make assessment process easy, AI – Powered assessment tool can provide real time feedback to students, enabling them to trap their progress make necessary adjustment to learning approach, AI education can increase the effectiveness of evaluation process, AI reduces human interaction and Incorporating and AI in the curriculum can help to connect the gap between theoretical knowledge and real world application.
8. Majority of the respondents agreed with AI can monitor the usefulness of the curriculum identify the areas for improvements, AI can monitor educators to refine optimize the content teaching methods continually and AI can monitor educators to refine optimize the content teaching methods continually.

## 6. Discussion

The focus of the study was to recognize distinct areas of curriculum and AI and also to assess prospects of AI into curriculum for elementary school. The AI is the important emerging



concept in education. AI is helpful for the application of technology in different fields including education. AI integration to educational curriculum can make students learning well rounded. The introduction of technology to teaching-learning processes, a series of methodologies have emerged, such as flipped classroom, everywhere learning, or personal learning environments related study of Galindo-Domínguez and Bezanilla (2021) also preferred the technology in education system. AI education identify the skills which are the need of modern era for jobs opportunities previous study of Jiahong Su (2022) also mentioned AI education to cope the demand of global world. AI integration to curriculum can promote innovation in students and also engage learners in learning. AI application in educational assessment can increase the accuracy, effectiveness and efficiency and helpful to provide feedback in few minutes. Related study of Zawacki-Richter, Marín, Bond, and Gouverneur (2019) discuss about the (Baker, Tricarico, & Bielli, 2019) approach educational AI tools from three different perspectives; a) learner-facing, b) teacher-facing, and c) system-facing AIEd. Learner-facing AI tools are software that students use to learn a subject matter, i.e. adaptive or personalized learning management systems or ITS. Teacher-facing systems are used to support the teacher and reduce his or her workload by automating tasks such as administration, assessment, and feedback and plagiarism detection.

AI based education system can boost the creativity of students of elementary schools by facilitating multimodal learning experiences AIEd tools also provide insight into the learning progress of students so that the teacher can pro-actively offer support and guidance where needed Integration of AI aligns with the need to equip students with the digital literacy skills essential for the 21<sup>st</sup> century. The major issues of implementation of AI in elementary schools include financial constraints, teacher willingness, ethical concerns and possible risks to students' privacy and psychological well-being. The future of AI in curriculum is promising. As AI technology evolves it will offer more advance and modified learning experiences. AI-driven tools and platform will become more integrating into the educational process. AI can monitor the usefulness of the curriculum and identify the areas for improvements. AI can monitor educators to define optimize the content teaching methods.

### **6.1. Recommendations**

1. It is recommended that curriculum designer and developer may include AI into curriculum through curriculum context and syllabus to inculcate AI education from the early school age to higher level of education. These training programs can be easily managed through elementary educational institutions in Azad Jammu & Kashmir.
2. It is recommended that education sectors may develop the collaboration among human and AI technology through conducting seminar and practical application of AI tools and strategies to education system.
3. It is suggested that government may offer teachers and school leadership training program for the promotion of AI education into the school education to cater the needs of demanding trends of modern world. These trainings should include AI and its applications in the classroom teaching.
4. It is suggested that educational sectors may offer research projects in field of AI to increase the AI education. Though this need some financial budget, however this is very important to engage academia to meet the needs of time in education.
5. It is recommended that educators may develop the critical thinking through involving students in reasoning and questioning about the AI to arouse the interest of students to indulge in AI education.
6. It is recommended that educational sectors may develop experiential learning in students through practical application of AI tools and strategies in education sectors.
7. It is suggested that educational sectors may involves AI applications to assess and evaluate students' progress.
8. It is suggested that educators may offer AI technology to solve Problems of real world to increase the accuracy of process of the solution of problem.
9. It is recommended that educators may offer quick and easy Feedback through the application of AI based technology.
10. It is recommended that curriculum developers and designers may consider the Inclusivity of students
11. It is recommended that educational sectors may abide by the principal of flexibility in terms of AI curriculum and environment to inculcate AI education in students.

12. It is recommended that government may offer the financial and technical incentives for the promotion of AI education in public and private education sectors.
13. It is recommended that higher education may offer education program in institute from early education to higher education to increase the AI education and to cope with the emerging demands of AI and technological revolution.

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