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EXPLORING PRE-SERVICE TEACHERS' BELIEFS ABOUT THE ROLE OF ARTIFICIAL INTELLIGENCE IN HIGHER EDUCATION IN GHANA

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ABSTRACT

The role of Artificial Intelligence (AI) in education has been well documented in developed societies. However, the phenomenon has received little attention in developing countries such as Ghana. This study examined pre-service teachers from one of the teacher education universities in Ghana beliefs about the role of artificial intelligence in higher education. This study employed the quantitative descriptive design to obtain data from a convenience sample of 231 pre-service teachers. The study revealed that majority of the pre-service teachers are very much aware of AI systems and that using AI related systems will have a positive effect on pre-service teachers' performance and that AI has the potential to replace teacher's absence. Further, majority of the respondents indicated that AI is relevant as it provides new ways of attaining distinction in teaching and learning. On the contrary, it was discovered that majority of the pre-service teachers indicated that they feel anxious when it comes to using AI related systems in learning. It is therefore recommended that more training and support systems be put in place to help and support pre-service teachers when using AI systems during teaching and learning during the post pandemic era.

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Introduction.

The concept of Artificial Intelligence (AI) has been considered as the most protruding tool in this modern world that is worth studying because of its ability to understand and perform human-like activities. Since the emergence of AI in 1955, the field has gone through several transformations since then (Huang & Smith, 2006). Artificial intelligence has become ingrained in a variety of fields, including information technology, marketing, healthcare, cybersecurity, art, education, and the military. AI enables machines to carry out activities that would otherwise be impossible for them to do. For years, we have all been interacting in ways that involved some form of artificial intelligence. For instance, amazon and Spotify use artificial intelligence to recommend books and music for its clients (Zeide, 2019). Further, social media sites have also been using artificial intelligence and big data to target ads and combat cybercrime by removing offensive comments. Forrest and Hoanca (2015) affirmed that AI is considered vital to show consumers different social media contents they want to see, combat spam, and improve the user experience.

Artificial intelligence is advancing, and this impacts significantly on the administrations and running of higher education. For instance, before the introduction of computers and technology, students

and instructors engaged in teaching and learning mechanically through human force. With the introduction of AI in computers, the educational field has seen a major improvement. According to Aldosari (2020), Universities today have surpassed their normal ways of functioning such as preserving heritage, identity, and education, to more technological advancement in creating new methods of teaching and learning. The expansion of artificial intelligence has offered higher education institutions innovative approaches to teaching and learning.

In accord with the importance of artificial intelligence, many countries including Ghana have quickly reformed their educational structures to suit this trend. It is worth saying that there has been an improvement in the government's investment in Information Communication Technology (ICT) in all levels of education in Ghana to prepare its students for the digital world and accrue the benefits that come with the integration of artificial intelligence. Because of this, many educational researchers have attempted to explore the role artificial intelligence plays in education, particularly higher education. Khare et al., (2018) studied the positive impact of artificial intelligence applications on student success whereas Tuomi (2018) investigated the importance of artificial intelligence in providing a favorable environment for education and the likelihood of answering some traditional questions in education using artificial intelligence applications. In addition, Fryer (2019) highlighted the role of robotics in the learning of other languages by students. Further, a study by Ma and Siau, (2018) stressed the importance of artificial intelligence in developing higher education rather than traditional methods of teaching.

Artificial intelligence can also be used as a tool in measuring students' performance through Learning Analytics. Learning analytics is an indicator to examine, understand and support student learning and most importantly measure the environment and condition of teaching and learning. Moreover, according to Long and Siemens (2011), many refer to Learning analytics as "the measurement, collection, analysis, and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs" (p. 34). The incorporation of technology into higher education has influenced teaching and learning practices and has also allowed for easy access to data concerning students, that can be used to improve learning. According to Ferguson (2012), learning analytics appeared to be a fast-growing and multi-disciplinary area of Technology Enhanced Learning (TEL). The effective use of artificial intelligence in learning analytics guarantees successful teaching and improvement in students' academic performance.

Artificial Intelligence remains an imperative discovery in the history of higher education institutions. It has introduced the world into robotics, speech recognition and for the higher level in education, it has enabled students to access courses online alongside checking for time spent and progress in general. Chaussignol et al. (2018) reiterated that Artificial intelligence is the action dedicated in making machines clever and applied in several areas in higher education. In most cases, a learning management system allows lecturers to deliver content online as well as tracking or monitoring student's involvement and achievement. According to Alias et al. (2005) learning management system (LMS) is a software program or web-based technology used for creation, delivery, and evaluation of the learning process. It can provide learners and instructors with a platform for discussion. In addition, LMS provide the instructor the platform to share course resources, assignment, announcement amongst others. Examples of LMS used in most higher educations are Sakai, Brightspace, Canvas, Moodle, Blackboard and learnDash (Mansfield, 2019). The learning management system is practically competing with the traditional face-face classroom and very soon it will replace teacher's absence. It serves as a purpose of (i) providing extra resources for lectures (ii) providing good and effective ways for evaluating learners (iii) enriching the interaction between lecturers and students (iv) enhancing student's abilities to use technology and most importantly (v) fostering collaborative work among faculty members (Alias et al., 2005).

AI in education can provide students with personalized recommendations. With AI, students can perform extremely better than before. Massive Open Online Courses (MOOCs) is a platform that allows university courses to be available at minimal or less cost to thousands of students (Yu et al., 2017). The use of MOOCs provides students with a more personalized learning. Today, with no difficulty at all, students can access information on various online platforms including online library as well as ability to interact with their lectures in a faster pace to get immediate feedback to enrich their learning. MOOC provides several tools such as; chats boards, live chats, lesser group classrooms and project based learning which aid in effective interactions between learners and instructors. Instance feedback from lectures through student's emails have effects on students learning process. Students get

the impression that their instructors truly care and want them to excel. However, such interactive sessions involve time and effort which has become unrealistic for MOOCs with large student populations. This has led lecturers to resort to automated feedback. Lim et al. (2021) conducted a study to understand the range of perceptions students held in relation to their feedback and found that students appreciated the substance of feedback messages, including how they gave crucial information on their progress and useful information on good study tactics such as assessment readings or concentrate on specific issues. However, some students reported negative perceptions of feedback messages. Specifically, some students believed that they were keeping up with their learning activities even though their feedback indicated otherwise. They felt that feedbacks were automated that is the content of the message was not made for single person but rather to the entire class. When students see their feedback to be nonspecific, they are unlikely to act on it (Winstone et al., 2017).

However, there have been few studies on what students and for that matter pre-service teachers' feel or belief about the use of these innovations associated with in ICT use in higher education institutions. However, students are one of the most important benefactors in the use of AI in education. A study by Falcao et al., (2019) in a Brazilian higher education institution reveals that "students feel the need of receiving reminders from teachers about upcoming deadlines, as well as messages when they miss them, which make them believe teachers care about their progress and creates a positive learning environment" (p.205). It is, therefore, significant to maximize studies in different countries, therefore, drawing the need to take into consideration the perceptions of tertiary students on learning analytics in Ghana.

The purpose of this study is to explore the different views and beliefs pre-service teachers from one the teacher education universities in Ghana have about the role in of AI in higher education since artificial intelligence plays an important role in students' education.

Big Data and Education.

Technology today is at the center of all sectors. It has permeated all facet of life, providing solutions to overwhelming challenges (Picciano, 2012). The impact of technology on everyday life has resulted in the total transformation of social and work life. One major indication of the pervasiveness of technology is the use of the internet, a tool whose significance has evolved over the years. The extensive reliance and dependence on the internet for various purposes has become a conventional development (Raja & Nagasubramani, 2018). One key feature of today's technologically driven world is the generation of enormous strings of data by digital devices via sharing, communicating, searching, and browsing (Manyika et al. (2011).

Big data plays a vital role in the modern economy due to the proliferation of data engendered by technology. According to the Manyika et al. (2011, p.1), "big data refers to datasets whose size is beyond the ability of typical database software tools to capture, store, manage, and analyze". The main feature behind big data is the adoption of learning analytics or data mining systems to put together data from different source (Buckingham Shum, 2012, Oracle, 2019). Machine learning technique and artificial intelligence applications are usually the tools used to build models to explore insights and make more accurate and precise decisions (Oracle, 2019). Many companies have capitalized on big data to gain valuable insights into the trends and behaviors of their customers, leading to the offering of services and products that improve overall business growth and performance (Oracle, 2019). This suggests the importance of insights generated by huge volumes of data to improve decision making.

The impact and ubiquity of technology in education cannot be disputed. Raja & Nagasubramani (2018) noted that technology has transformed education from a passive to an interactive state by supporting instructional delivery and enhancing learning. The dynamic components of the technological infrastructure in higher education institutions including LMS (Learning Management Systems), end user devices, servers and campus network offer huge possibility for data-driven decision making (Chaurasia & Rosin, 2017). This is possible because the digital tools and platforms create voluminous data sets. Consequently, most higher education institutions, mostly in the developed countries, are following in the steps of the corporate world by relying on these data sets to promote institutional development, and also support and improve learning (US Department of Education, 2012). Big Data in education is mainly concerned with the elements of data mining, learning analytics and online decision-making by analyzing behavioral and academic patterns, as well as the application of forecasting techniques (Li & Zhai, 2018).The two areas that provide the much needed solutions in the forms of visualization, advanced

analytics and data discovery to make sense of big data in education are Educational data mining and learning analytics (Chaurasia & Rosin, 2017; US Department of Education, 2012).

Educational Data Mining (EDM).

Educational data mining focuses on the adoption of machine learning, data mining and statistics to analyze data on teaching and learning (US, Department of Education, 2012). According to Baker and Yacef (2009) "it is an area of scientific inquiry centered around the development of methods for making discoveries within the unique kinds of data that come from educational settings, and using those methods to better understand students and the settings in which they learn" (p. 4) .The concept is based on the assertion that data from students on various technology platforms, especially online learning, can be collected and organized in a large scale in order to build models using algorithms (US Department of Education). This is in congruent with Suhirman et al. (2014) conclusion that educational data are embedded with knowledge which can be extracted through data mining techniques. They further add that the process of mining educational data entails the conversion of raw data from educational systems into valuable bits of knowledge that have relevant impact on practice and research as well. The methods pertaining to educational data mining are prediction, clustering, relationship mining, distillation of data for human judgment and discovery with models (Baker, 2011).

The main goals of data mining in education are (Baker & Yacef, 2009; Baker, 2011):

I. The use of models to predict students' future learning by relying on students' metacognition, attitudes, knowledge, and motivation.
II. Enha cing knowledge about learning and learners by adopting frameworks based on students' models and pedagogy.
III. Analyzing effects of various pedagogical approaches to improve learning by using learning software tools.
IV. Discovering models that optimize learning content and instructional sequences.

Learning Analytics in Higher Education.

Over the years, learning analytics has evolved into a well-recognized discipline. This was the result of the efforts of the Society of Learning Analytics Research (Solar). During their maiden conference, they defined learning analytics as "the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs" (Proceedings of the International Conference on Learning Analytics, 2011). According to Buckingham Shum (2012), learning analytics has turned out to be the principal term for seeking to gain an in-depth understanding of the analysis of learning systems to improve learning.

Siemens (2013) observed that learning analytics has two complimentary components which are techniques and applications. Techniques deals with adopting models and algorithms for data analysis whereas applications concern the ways in which techniques are employed to improve teaching and learning. Although they draw on theories and concepts from various fields, education and computer science are the two main fields whose theories underpin these two components of learning analytics (Gašević et al., 2015).

According to the US Department of Education (2012), the application of learning analytics contributes to answering the following core questions (US Department of Education, 2012):

i. At what point can students advance to the next topic?
ii. At what point are students considered not to be progressing?
iii. At what point is a student considered to be at risk?
iv. What level is a student likely to reach without intervention?
v. What is the appropriate course of action for a particular student?
vi. Should a counselor be involved?

In a nutshell, learning analytic is used to enhance personalization of the learning experience (US, Department of Education, 2012).

Learning analytics helps to predict students' academic performance. This was revealed in the study by Awang and Zakaria (2013) who integrated an Online Assessment System (OAS) tool into an integral course for 101 college students. The results indicated that, the learning analytical tool employed improved students' performance by 33.1%. Further, learning analytics compels teachers to provide

support to underperforming students as indicated by Lu et al., (2017). Similar results were reported by Kuzilek, et al., (2015), who developed a predictive model that instructors or tutors can use to identify underperforming students. Also, students who had access to a learning analytics dashboard improved their scores and displayed superior retention behavior (Arnold & Pistilli, 2012). In this regard, institutions have employed learning analytics tools that are embedded into their LMS and allows for the tracking of students' development and predict student success (Campbell et al., 2007).

In addition, feedback from learning analytics helps in self-regulated learning, to the extent that the feedback provided to students contain information that stimulates interaction with teachers and peers about learning (Nicol & Macfarlane-Dick, 2006). That is to say that the incorporating AI in monitoring student progress (learning analytics) improves the efficiency at which teachers review, comment, and provide students with diagnosis reports of their personalized learning abilities (Yang et al., 2020).

Learning analytics also promotes more "personalized learning," which would, among other things, enable students to have more successful learning experiences (Greller & Drachsler, 2012). Students can use learning analytics to reflect on their learning and improve metacognitive abilities and also helps in enabling self-directed and self-regulated learning. Learning Analytics provides opportunities to reflect about learning and develop metacognitive skills and gain knowledge about their learning process.

In recent years the importance of learning analytics on the performance and improving the quality of teaching and learning has been of great concern. To measure the usefulness of LMS usage on students' learning performance and quality of education studies have relied on data from users' opinions and subjective interpretation through questionnaires. According to a study by Mwalumbe and Mtembe, (2017) at Mbeya university in which a developed learning tool was tested and applied to establish the relationship between LMS usage and student performance and the quality of education. Data such as the number of downloads, forum postings, peer interactions, time spent in the system, number of logins performed, and number of exercises conducted by students were among the criteria included in the learning analytics tool. The results revealed that forum posts, peer interactions, and exercises using the analytic tool were found to have an impact on student learning performance in the study. However, the number of downloads, login frequency, and time spent in the LMS had no effect on students' performance.

Again, according to Van Harmelen and Workman (2012), learning analytics provides students with reading material and learning activities suggestions and identify the need for pedagogical reforms and improve their performance. Students can access information about their grades and participation in learning activities and exams via feedback supplied through learning analytics dashboards. Another key application of learning analytics is to provide students with more information about how they are progressing and what they need to do to achieve their educational goals. Meanwhile, some colleges are implementing analytics-based tools to assist students in choosing future courses, based on data about their job interests, aptitudes, and grades from past modules, to provide the best possible path.

Artificial intelligence anxiety.

Learning analytics tools are increasingly being adapted into teaching and learning especially in higher education. But with the implementation of this in the educational system comes with its own challenges. Technology in Ghana is not well advanced, and lack the necessary systems and education needed to easily adapt it in our educational system. These systems are sometimes quite complex to navigate and also costly in terms of time and money needed to train students in being acquainted in the use of these tools (West et al., 2016). This is due to lack of funding to support the acquisition of the necessary technology, lack of resources and education on the use of these computer base programs in our learning. Due to this, there is not enough knowledge on the technical know-how of these systems to effectively adopt them in learning activities.

Some students may shy away from it due to the fear of making mistakes which could not be corrected thereby causing them to fail in their studies. There are some who find it intimidating to use because they lack the necessary skills and knowledge on how to work with the tools and how to correct mistakes they make in the process of learning. There are some who think they could lose some information in the process due to the lack of knowledge and technical know-how of the tools involved. These concerns therefore create some form anxiety when it comes to the use of AI systems. And these anxieties can be traced to computer anxiety (Chuo et al., 2011; Esterhuyse et al., 2016;

Korobili et al., 2010; Marcoulides, 1989), mobile computer anxiety (Wang, 2007), internet anxiety (Chou, 2003), and robot anxiety (Nomura et al., 2006; Wu et al., 2014). Studies have also shown that the feelings of anxiousness people have towards new technologies creates negative feeling or attitudes that affect the adoption and use of novel technologies (Agudo-Peregrina et al., 2014; Cazan et al., 2016). Specifically, the attitude of teachers and students towards the adoption and use of novel technologies such as mobile technologies are negatively affected by anxiety (MacCallum & Jeffrey, 2014). That is to say that university teachers' and pre-service teachers' attitudes towards adopting novel technologies during teaching and learning are affected by anxiety as expressed by (Clark-Gordon et al., 2019; Park et al., 2019).

Methods and Materials.

This study adopted the quantitative descriptive design to explore the perceptions of 260 pre-service teachers that were conveniently selected from one of the teacher education universities in Ghana. With the help of google forms, an online questionnaire was deployed in gathering data from the respondents. The questionnaire consisted of 29 items on a 5-point Likert scale, "strongly disagree", "disagree", "neutral", "agree", and "strongly agree". The questionnaire had five sections namely, participant's demographics, student's awareness on AI, student's usage of AI, relevance of learning analytics and learning analytics anxiety.

To address ethical concerns, respondents provided their comments voluntarily and anonymously, therefore confidentiality was not a concern. In addition, no personal information about specific respondents were requested in the questionnaire. Also, results were not reported based on individual responses but rather on the aggregated form. Thus, it was impossible to identify any respondent due to the aggregated data analysis. Responses from participants were exported to google sheet and analyzed by IBM SPSS Statistics 22.

Results.

Table 1 present the results on demographic characteristics of the respondents for this study.

Table 1. Demographic information of respondents.

Demographic	***Frequency***	***Percentage***
Gender		
Male	131	50.4
Female	129	49.5
Age		
Under 20	43	16.5
21-25	196	75.4
26-29	20	7.7
30+	1	4
Level		
100	62	23.8
200	65	25
300	64	24.6
400	69	26.5

As indicated in Table 1, there were almost equal numbers of males and females (50.4% and 49.5% respectively). In terms of age, majority of the pre-service teachers (75%) were between the ages of 21 – 25. Also, the respondents were evenly spread across the four years of university education.

Students' awareness of AI related learning management systems.

Pre-service teachers were asked to indicate their awareness of AI by responding to two items on the questionnaire and the results are presented in Table 2. It can be inferred from Table 2 that 120 pre-service teachers "often" use AI in their personal life while 100 students revealed that they "sometimes" use AI in their life. Also, 21 students were of the view that they "barely" use AI in their personal life. Also, respondents were asked to indicate the type of learning management systems they mostly use in their learning activities. The results as shown in Table 3 indicated that 231 pre-service teachers actively use "Sakai" whereas 12, 9, 4, and 2 pre-service teachers engage in the use of "Moodle", "Brainly", "Blackboard Learn" and "Carnegie learning" respectively. It was also shown that majority of the pre-service teachers (94%) were familiar with video conferencing and intelligent tutoring systems.

Table 2. Use of AI systems.

	Frequency/Percentage				
Knowledge	Yes, often	Yes, sometimes	Yes, rarely	No	Not sure
Do you use any artificial intelligence in your personal life	120(46.2)	100(38.5)	21(8.1)	10(3.8)	9(3.5)
Do you use any of these LMS; Sakai, Moodle, Brainy etc. in learning	139(53.5)	101(38.8)	14(5.4)	6(2.3)	0

Table 3. Common learning management systems (LMS).

	Frequency	***Percentage***
Which of these learning management systems do you mostly use for your learning activities;		
• Sakai	231	88.8
• Brainly	12	4.6
• Moodle	9	3.5
• Blackboard Learn	4	1.5
• Carnegie learning	2	0.8
Which one of these AI Media are you familiar with;		
• Video conferencing/Video lectures	214	82.3
• Intelligent tutoring system/Online assistants	29	11.2
• 3-D gaming for learning	5	1.9
• Digitized Guide of textbooks	4	1.5
• Internet radio platforms	1	0.4
• Computer Animation	7	2.7

Perceived benefits of AI usage to pre-service teachers.

Table 4 provides findings regarding the benefits in using AI in pre-service teachers' learning. The results indicate that majority of pre-service teachers (72%) agreed that AI supports their learning. Similarly, 74 percent of the sampled pre-service teachers indicated that the use of artificial intelligence has had a positive impact on their learning.

Table 4. Benefits of AI to pre-service teachers.

	Frequency/Percentage		
Usage	Agree	Neutral	Disagree
I actively use artificial intelligence in my learning.	201(77.3%)	45(17.3%)	14(5.4%)
Artificial intelligence supports my learning.	186(71.5%)	47(18.1%)	27(10.4%)
I feel that artificial intelligence has the potential to replace current aspects of my learning activities.	184(70.8%)	48(18.5%)	28(10.8%)
Having access to artificial intelligence has had a positive impact on my learning performance.	191(73.5%)	52(20%)	17(6.5%)
Artificial intelligent can replace teacher's absence.	165(63.5%)	59(22.7%)	36(13.8%)

Relevance of Artificial Intelligence.

Table 5 provides results regarding the relevance of artificial intelligence to pre-service teachers. The results indicate that majority of the sampled pre-service teachers agreed that artificial intelligence was relevant to their learning in various ways. For instance, 86 percent of the respondents agreed that artificial intelligence can be used to create flexible pathways to ensure students success in learning. Similarly, 211 out the 260 sampled respondents indicated that artificial intelligence can be used to predict students' performances from multiple indicators. Further, similar patterns in agreement were reported for statements like; AI provides new ways of achieving excellence in teaching and learning (84%), AI provides students with new information to make the best choice about their education (87%), and AI enable students to take control of their own learning (83%).

Table 5. Perceived relevance AI.

	Frequency/Percentage				
Relevance	S.Agree	Agree	Neutral	Disagree	S.Disagree
AI provides students with new information to make the best choice about their education	106(40.8)	122(46.9)	17(6.5)	11(4.2)	4(1.5)
AI has the potential to transform learning environments	94(36.2)	131(50.4)	21(8.1)	9(3.5)	5(1.9)
AI boosts students retention	71(27.3)	135(51.9)	37(14.2)	11(4.2)	6(2.3)
AI provides new ways of achieving excellence in teaching and learning	91(35.0)	139(53.5)	16(6.2)	10(3.8)	4(1.5)
AI allows students to access more information about their courses	88(33.8)	139(53.5)	21(8.1)	7(2.7)	5(1.9)
AI can be used to create flexible pathways to learning success	78(30.0)	147(56.5)	20(7.7)	10(3.8)	5(1.9)
AI enable students to take control of their learning	74(28.5)	142(54.6)	29(11.2)	10(3.8)	5(1.9)
AI service will show how my learning progress compares to my learning goals and the course objectives	77(29.6)	147(56.5)	24(9.2)	8(3.1)	4(1.5)
AI compels teachers to provide support to underperforming students	79(30.4)	137(52.7)	23(8.8)	16(6.2)	5(1.9)
IA can help predict student's performance	70(26.9)	141(54.2)	24(9.2)	21(8.1)	4(1.5)
In general AI improve the quality of teaching and learning	83(31.9)	137(52.7)	27(10.4)	9(3.5)	4(1.5)

This study also sought to find out how anxious pre-service teachers are when it comes to the use of artificial intelligence systems and the result is presented in Table 6. It was revealed that majority of

the pre-service teachers (80%) indicated that they felt apprehensive about using AI systems. Also, about 62 percent of the respondents indicated that to think that they will lose a lot of information using AI systems. Similarly, 60 percent and 56 percent of the respondents indicated that they feel hesitant to using AI systems for the fear of making, and AI tools are somehow intimidating to them.

Table 6. Anxiety with using AI.

	Frequency/Percentage				
Anxiety	S.Agree	Agree	Neutral	Disagree	S.Disagree
I feel apprehensive about using AI	49(18.8)	109(41.9)	33(12.7)	52(20.0)	17(6.5)
It scares me to think that I could lose a lot of information using AI tool by hitting the wrong key	45(17.3)	116(44.6)	26(10.0)	51(19.6)	22(8.5)
I am hesitant to use AI for fear of making mistakes which I cannot correct	51(19.6)	105(40.4)	33(12.7)	56(21.5	15(5.8)
AI tools are somehow intimidating to me	37(14.2)	109(41.9)	37(14.2)	52(20.0)	25(9.6)

Discussions.

This study examined pre-service teachers' belief about the potentials of Artificial Intelligence in higher education from a developing country perspective. The results indicated that most pre-service teachers use AI systems in one way or the other but are not aware that those systems are based on artificial intelligence. It was also revealed that majority of the pre-service teachers were familiar with video conferences/video lectures such as zoom meetings, google meetings amongst others. This is an indication that majority of the pre-service teachers are very much aware of AI systems. The results further indicated that using AI related systems has had a positive change in pre-service teachers' performance and they believed that AI has the potential to replace teacher's absence. This finding is consistent with that of Allen and Seaman (2017), who predicted that machine teachers will be in high demand in the near future. However, Khare et al. (2018) argued that the human teacher is unlikely to be replaced soon as expressed in the statement below:

> "As humans, we still need personal connections for inspiration, compassion, self-reflection, imagination, and life context. Learning is every bit as much emotional and social as it is teaching technique and technology. The replication of intelligence by machines may not be matched by their abilities to emote or socialize, indeed the concept of artificial emotion seems to be a contradiction in terms. Thus, the ability of humans to express empathy and to provide emotional as well as intellectual understanding to form connections and form social bonds will ensure, at least for the near future, human advising and tutoring are superior supports for human learning" (Khare et al., 2018 p.70).

Within the education sector, there has been increased application of artificial intelligence, over and above the conventional understanding. of Artificial intelligence as a supercomputer to include embedded computer systems. It is posited that the application of robots, working together with teachers or colleague robots are being applied to teach children routine tasks, including spelling and pronunciation, and adjusting to the student's abilities (Toumi, 2018). Similarly, web-based, and online education has transitioned from simply providing study materials online for students to simply download, study, and do assignments for grades, to include intelligent and adaptive web-based systems that learn instructor and learner behavior to adjust accordingly, to enrich the educational experience. Artificial intelligence in education, according to Chassignol et al. (2018) has been incorporated into administration, instruction or teaching, and learning. Williamson and Eynon, (2020) stated that the application of AI algorithms and systems in education is gaining increased interest year by year. With the uncertainty created concerning the replacement of human resources substitutions and relocations created by AI,

future educational employment and required ranges of skills would be fundamentally unique in relation to now (Siau, 2017).

It has been argued reliably that artificial intelligence integration offers possibilities for teaching and learning activities in higher education (Bates et al., 2020). Nonetheless, it is crucial to note that artificial intelligence, admittedly, is at its performing end to replace teachers. This stance cannot be jettisoned by merely considering the limitations of AI but must be seen as providing alternatives for its augmentation (Newell,1982). It is evident that computing algorithms are impacting significantly on the most mundane aspects of human life, which helps in records keeping and employability. Higher education is placed at the center of this profound change, which brings with it both extraordinary opportunities and risks (Popenici & Kerr, 2017). This important crossroad requires careful consideration and analysis from an academic perspective, especially as we can find tendencies to look at technological progress as a solution or replacement for sound pedagogical solutions or good teaching in higher education.

Like the findings of this study, the advancement of artificial intelligence is gearing towards a point where learners will not feel the need to get in touch with facilitators. This development will lead to a level where teachers' roles will be gradually replaced in the space of teaching and learning. However, according to Yang Lu (2019), the interconnectedness in the functions of humans and AI related systems could be mutually reinforcing and develop together to yield a better outcome of education in the future. Similarly, Zhang and Aslan (2021) revealed that artificial intelligence across various fields of human endeavours is rapidly advancing and its application in education is expected to grow rapidly soon.

In terms of relevance, majority of the respondents indicated that AI is relevant as it provides new ways of attaining distinction in teaching and learning. This supports Yang et al., (2020) findings that the idea of involving AI in monitoring student's progress (learning analytics) will improve the efficiency at which teachers' review, comment, and provide students with diagnosis reports of their personalized learning abilities. Not only does AI improves learning but in general it helps both teachers and students embrace new methods of improving their study success.

In terms of anxiety with the use of AI related systems, majority of the pre-service teachers indicated that they feel anxious when it comes to using AI related systems in learning. This finding is consistent with earlier studies that looked anxiety associated with the use and adoption of novel technologies such mobile technologies (Clark-Gordon et al., 2019; Park et al., 2019).

Conclusion.

It can be concluded from this study that pre-service teachers sampled for this study are aware and familiar with AI systems and believed that using AI systems has had positive impacts on their performance. Despite the positive impacts of using AI, some pre-service teachers experienced some form of anxiety when using AI systems which make them developed some negative attitude towards the using of AI related systems and tools.

It is therefore recommended that more training or orientation and support systems to be put in place to help pre-service teachers identified the importance of AI in their training and to easily navigate the A system to avoid making mistakes that could affect the work they perform on the learning analytic system. Schools and institutions should encourage the use of learning analytics in their teaching and learning process because of its potential to enhance the learning and performance of pre-service teachers.

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