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How AI is Transforming English Language Teaching Classrooms: Benefits, Critical Issues, and Challenges

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ABSTRACT: Artificial Intelligence (AI) is transforming the way we teach and learn today, and it will have an enormous impact on what our classrooms look like in the future. With AI, students can experience a much higher degree of personalization in their education. It provides opportunities to make learning more efficient and accessible for all students. There are many examples of how AI will change education, to include personalized learning paths, intelligent tutoring systems, automatic grading systems, predictive analysis tools that can idenify students at risk of failure, and custom instructional materials based on the specific needs of each student. In addition, AI-based tools can increase classroom engagement using VR/AR experiences, smart classrooms, and interactive educational content. Teachers can use AI tools to automate lesson planning, receive professional development support, get real-time feedback about their teaching practices, and free up time so they can spend more of it interacting with students. Additionally, AI will be able to monitor students' emotional/mental health, translate in real-time, and facilitate international collaboration through virtual learning environments. The integration of AI in education also creates new ways to assess student performance (e.g. competency-based assessments), create new analytical reports that help determine where a student may be struggling, and ultimately provide better educational outcomes for all. On the whole, AI has the ability to empower both teachers and students by creating a more effective classroom experience and environment, increasing access to quality education, and encouraging life-long learning in a technology-driven future.

KEYWORDS*: artificial intelligence (AI), education technology, smart classrooms, learning analytics, educational innovation*

I. OVERVIEW

AI is an exciting technology that has opened up many new possibilities for English Language Teaching (ELT). With a growing number of digital tools being developed, AI is becoming increasingly used in language learning environments to support teachers, engage students, and create personalized learning experiences. There are many different types of AI technologies available to support the way we teach and learn English in varying educational settings, including intelligent tutoring systems, automated feedback tools, speech recognition software, and adaptive learning platforms. AI provides a great opportunity to improve the way we teach and learn English in various educational settings. The most significant advantage of using AI in ELT classrooms is the capability to provide personalized instruction based upon a student's specific needs, proficiency level, and learning style. AI powered systems can evaluate how well students perform in real time, determine where a they excel and need to improve, and then provide customized activities and feedback to help them learn faster. In addition, AI tools can help students become motivated to learn and participate in class by providing interactive learning experiences, immediate feedback, and more access to authentic language resources. Teachers can also take advantage of AI tools that will help them grade assignments, plan lessons, manage classrooms, and analyze data so that teachers can spend more time interacting with their students and engaging in meaningful communicative teaching. Although there are many positive aspects of integrating AI into ELT classrooms, there are also a number of concerns, critical issues, challenges, and questions that arise when utilizing AI in all aspects of education. Some examples include data privacy, student surveillance, algorithmic bias, and ethical uses of educational technologies. Moreover, too much reliance on AI may limit opportunities for human interaction which is vital for both effective language learning and social development. Moreover, inequalities in access to technology may create additional barriers for students and schools with different levels of financial and technological resources. Teachers and schools have to deal with multiple challenges as they try to implement AI into their ELT programs. Many teachers need additional education/training and professional development in order to use AI tools appropriately in their classrooms. Schools may have difficulty with implementation expenses, technical limitations, and inadequate infrastructure. Resistance to technological change, fears of losing jobs due to automation, and finding the right balance between technology and traditional

teaching methods all pose ongoing barriers. Ultimately, AI has immense potential to change ELT classrooms by enabling more personalized, efficient, and accessible ways of learning a language. Successfully implementing AI into ELT classrooms will require overcoming the ethical, pedagogical, and practical issues that arise with these new technologies. To achieve successful implementation of AI into ELT classrooms will require a balanced approach that maximize the benefits of AI along with the knowledge and experience of human educators to produce effective and inclusive language learning environments.

II. Transformative ELT Classroom Possibilities: Benefits

(1) Personalized learning: How AI will change how we teach is through personalized learning. Instead of using the same method to teach all students, AI will allow educators to develop a unique educational experience for each learner based upon his or her ability, interest, and rate of learning. Using data collected from student performance and behaviors, AI will allow educators to determine what areas of instruction need to be addressed with additional attention and support. Furthermore, using these same data points, AI will be able to assist educators in developing an education plan specifically designed for each individual learner. As a result of this type of individualized instruction, students will be better able to understand concepts presented in class, and will be more motivated to participate in the learning process (Barker & Yacef, 2009; Ventura, 2020).

Adaptive learning paths: AI will design specific learning paths for students dependent upon their individual progress and speed. Those students who are able to complete tasks rapidly will be able to move forward at a faster pace than those who require additional time and/or practice. The flexibility of this type of learning pathway ensures that every student is learning at a pace that fits their needs (Wolf, 2010).

Customized feedback: AI will deliver instantaneous and customized feedback to students concerning the quality of their work. Rather than providing only "correct" or "incorrect" answers to questions on tests, quizzes and homework assignments, AI will explain why a particular answer was wrong and offer solutions to the problem. The ability of students to get feedback immediately will enable them to correct misunderstandings quickly and build confidence in their ability to learn (Luckin &. Holmes, 2016).

AI tutoring systems: AI Tutoring Systems (ATS) are essentially tutors who can be accessed at any time. If a student does not understand a concept clearly, an ATS can provide a variety of ways to explain the concept. Furthermore, if the student requires additional help understanding a concept, an ATS can provide multiple examples demonstrating how to apply the concept. An ATS can also guide a student through the application of a concept until he/she understands it completely. Finally, in addition to serving as a tutor within the classroom setting, an ATS can also assist students via independentl study outside the classroom.

Differentiated learning methods: AI can adapt textbooks, homework assignments and other educational resources to meet a variety of learning styles and levels of achievement. For example, if a student requires a simpler explanation of a concept, an ATS can provide simpler materials to study. Conversely, if a student is capable of mastering more complex concepts, an ATS can provide more intricate and elaborate materials to study. Therefore, having the ability to use differentiated learning methods will make learning more accessible to a greater number of students (UNESCO, 2021).

Language learning assistants: Language learning assistants are ATS that help students practice listening, reading, writing and speaking in new languages. Language learning assistants can also translate conversations in real-time and correct or provide suggestions for pronunciation, grammar, and vocabulary errors. As a result, students will improve their language skills faster and with greater confidence.

(2) Administrative efficiency: With AI, schools will have the ability to automate routine tasks and allow teachers to manage information better. Educators and administrators spend a great deal of time preparing for class, grading and giving feedback on assgnments, providing student support, dealing with classroom management, creating and manging schedules, adhering to professional responsibilities, and generating reports (among many other important duties). All of those things can be done much faster and with greater accuracy using AI. When educators don't have to worry about those types of tasks, they'll have more time to focus on teaching students in effective and meaningful ways. Additionally, AI systems can collect and analyze data related to education in order to assist with making decisions and identifying areas in which students might need additional assistance (Williamson & Eynon, 2020).

Automated grading: AI-based grading systems will allow teachers to handle all parts of assessment quickly. As a result, teachers will save a significant amount of time, and students will receive immediate feedback that identifies errors and provides ideas for improvement. The immediacy of the feedback allows students to learn from their mistakes and fix them faster. Furthermore, automated grading may lead to more consistent and fair evaluations (Siemens & Baker, 2012).

Automated attendance tracking: Checking attendance will become automated with AI systems that utilize technologies like facial recognition or digital monitoring. Attendance will be recorded automatically when students enter a classroom or attend an online lesson. This eliminates the need for teachers to manually record attendance, and improves accuracy. In addition to receiving automatic attendance reports, teachers, administrators, and parents will also receive real-time updates regarding absences or tardiness.

Data-driven insights: AI systems will gather student data such as grades, participation, and classroom engagement, which will result in valuable insights for teachers and schools. These will allow teachers to identify learning gaps among students, track progress toward goals, and develop better instructional methods. What's more, they will then be able to utilize this data to create better educational opportunities for all students (Tlili et al., 2021).

Predictive analytics: Analytics will be utilized by AI systems to detect students who are likely to struggle academically or fall behind. By identifying patterns in students' academic performance and behaviors, AI will recommend intervention strategies such as tutoring, counseling, or recommending additional support. Early detection of potential problems will ultimately help increase student success, motivation, and assurance (Ifenthaler & Gibson, 2019).

Administrative task automation: Many administrative tasks can clearly be automated by AI systems, which will help schools function more effectively as AI automates repetitive administrative tasks quickly and accurately. This automation will decrease the overall workload, allowing teachers to devote more time to helping students develop and grow in positive ways (Selwyn, 2019).

(3) Learning content and resource creation: Artificial Intelligence will change how teachers develop educational content and classroom materials. While teachers spend a lot of time on a variety of administrative and classroom tasks, AI-powered systems can perform most of these faster and more efficiently. With the use of AI, teachers can produce individualized, interactive and current learning materials that are suitable for every student. This will result in less time spent on a mutitude of duties and greater engagement and effectiveness in the learning process (Holmes et al., 2019).

AI lessons: Using AI, teachers will develop customized lessons (as well as activities and assessments) aligned with curriculum objectives and student requirements. Lessons will be tailored to meet a wide range of abilities, learning styles and interests. For instance, if a student struggles with a particular concept, the lesson may contain simpler explanations. If a student excels in a subject area, the lesson may include more challenging work. The result is a more personalized learning experience (Mayer, 2021).

AI textbooks: Textbooks created using AI will be interactive and continuously updated with new information. Digital textbooks developed using AI will provide students with the ability to review additional explanations, watch video tutorials, complete assignments, or explore advanced content whenever necessary. This type of textbook will provide students with a more flexible, engaging and relevant way to learn. It will also address the the issue of materials being outdated quickly and the need for new resources on a contnuous, ongoing basis.

AI generated resources: Artificial Intelligence will generate practice tests and quizzes, worksheets, flashcards, educational games, etc.. Teachers will be able to save time during the lesson preparation phase, while students receive resources that align with their current level of understanding and skill set. As a result, students will receive more targeted and efficient forms of learning support (Plass et al., 2015).

AI interactive content: Artificial Intelligence will produce interactive simulations and immersive learning experiences. In other words, interactive content helps students develop a deeper understanding of complex concepts through hands-on learning (Quinn, 2013).

(4) Classroom management: AI will assist with classroom management in several ways, to include providing teachers with information about student behaviors, increasing student engagement, decreasing student distractions, and organizing classroom activities in a more effiient manner. Moreover, AI will provide teachers with real-time feedback that assists them in creating more engaging, supportive, and productive learning environments. Additionally, by assisting with the automation of many routine management activities, teachers will be able to spend more time interacting with students and focusing on instructional strategies (D'Mello & Graesser, 2012).

Behavioral insights: AI will monitor students' behaviors, and provide teachers with data regarding students' emotional state, participation, and level of attention. For example, an AI system may detect signs of confusion, frustration, or disengagement during a lesson. As a result of this data, a teacher will be able to provide timely assistance to students who need it (Boulay, 2016).

Tracking student engagement: AI tools will monitor how engaged students are during classroom activities and lessons. By monitoring participation, interaction, and attention levels, AI tools will assist teachers in determining when students begin to become distracted. Once a teacher is aware that a student has become unfocsed or distrait, he/she may modify the speed of the lesson or incorporate more interactive elements into it in order to regain a given student's attention and boost motivation (Biwas et al., 2016).

Grouping students automatically: AI will group students together based upon their individual characteristics, to include, for example, learning style, personality type, and strengths or skill set. Automatic grouping enables teachers to easily facilitate collaboration and cooperative peer learning. Furthermore, teachers can modify the criteria used to group students depending upon the type of classroom work being conducted.

Detecting student distraction and off-task behavior: AI systems will enable teachers to determine when students are distracted or off-task during a lesson. Teachers may be notified when students are losing focus or

utilizing technology inappropriately (i.e., for non-educational purposes). Notification of these behaviors will enable teachers to quickly redirect the attention of the entire class to the instructional activity at hand.

Voice-controlled classrooms: Teachers will utilize AI-powered technology to manage classroom technology and resources via vocal commands. Teachers may utilize AI voice assistants to carry out lessons and display presentation materials in a more efficient manner. Utilization of voice-controlled technology will enable teachers to save time and increase the level of organization in their classrooms (Dillenbourg, 2016).

(5) Student support and wellbeing: AI can improve the quality of emotional, academic, and personal support that students need. In addition to improving learning, AI can assist teachers in identifying student needs, reducing student stress, and creating inclusive classroom environments. Through the use of AI systems to monitor student behaviors, participation and performances, teachers and counselors will be able to more effectively assist students in addressing their well-being issues. However, although AI technologies will not replace the need for human care and guidance, they can serve as valuable tools to supplement support services (Calvo & D'Mello, 2010).

AI counseling: Chatbots and virtual assistants that are powered by AI will offer students emotional support and mental health resources. Students will be able to use these systems to address issues relating to stress, anxiety, academic pressures, or other personal concerns within an environment that is both private and supportive. AI-based tools can provide students with coping mechanisms, relaxation techniques, and advice and encourage students to seek out professional assistance when warranted (Belpaeme et al., 2018).

Mental health monitoring: AI-based tools will track patterns in student behavior, participation, attendance, and academic performance in an effort to detect potential indicators of emotional distress. When a student exhibits symptoms of overwhelming distress, pressure, trepidation, agitation, and/or withdrawal, the system may notify teachers or counselors allowing for immediate intervention to occur, which may prevent the development of greater emotional or academic difficulties.

Tailored learning pacing: AI will enable adjustments to be made to learning schedules and workload assignments based upon students' mental and emotional energy levels. Students experiencing feelings of being flustered, exhausted, or even besieged may be granted additional time, lighter workloads, or more opportunities for review while advanced learners may progress or move forward at a faster rate. By providing individualized pacing, AI-based systems may decrease students' stress and increase the likelihood of positive learning outcomes.

Learning disability support: AI-based tools will facilitate the identification of learning disabilities and provide students with individualized strategies to support them. For example, students who experience difficulty with reading may utilize text-to-speech tools, simplified educational materials, or additional practice activities. AI-powered support systems can enhance the accessibility of education for students and contribute to building students' confidence and autonomy (Breazeal, 2016).

Inclusive learning: AI will contribute to creating more inclusive classrooms by enabling the customization of learning materials for students with special needs. The implementation of features including speech recognition, language translation, closed captioning, and personalized learning materials will ensure that all students have equal access to quality education. Consequently, AI-based support systems will promote fairness and inclusivity for diverse learners. (Mitchell, 1997).

(6) Collaboration and communication: AI will create new ways for students, teachers and schools to collaborate and communicate globally through technology. Through AI-based technology, students will have the opportunity to work collaboratively as a team, communicate with each other regardless of language, and take part in both physical and digital learning environments. Technologies used in the classroom can help facilitate collaborative work, cultural exchange, and global learning experiences while providing students with the skills necessary to develop effective communication and collaboration skills (Kress, 2010; Bailenson, 2018).

Collaborating globally on projects, discussions and research: Through AI-based technologies, students will be able to collaborate on projects, discussions and research with students around the globe. Students will be able to share their thoughts and views with one another, compare perspectives, and learn about different cultures. These global interactions will potentially give students a better understanding of the world and improve their teamwork skills.

Creating immersive virtual reality classrooms: Virtual reality classrooms created by AI will allow students to be immersed in an educational environment where they can attend class and learn about the world in unique and ptofound ways. For example, students can visit historical sites, perform virtual experiments, or participate in interactive lessons through digital environments that will provide them with a more engaging and captivating method of education (Thomas et al., 2013).

Providing academic assistance via AI-powered virtual assistants: Students will be able to receive academic assistance at any time of day from an AI-powered virtual assistant. They will be able to ask questions, review lessons, receive study help, and get personalized explanations when needed. In addition, these virtual assistants will be able to assist students in keeping track of their assignments, schedules and classroom communications.

Translating instantly for collaborative efforts: By using AI-powered translation tools, students with different language backgrounds will be able to communicate and collaborate in real-time. Students will be able to translate conversations, messages and classroom materials instantly into their native language, which will create a more inclusive and effective environment for international collaborations and multilingual classrooms (Jenkins, 2009).

Supporting group project coordination: AI will be used to help coordinate group projects through assigning tasks, monitoring progress, and facilitating communication between team members. Moreover, systems developed using AI will allow all students to contribute equally to group activities, increase joint efforts, and ensure organization and productivity.

(7) Learning environment enhancement: The classroom of the future will become smarter, more flexible and adaptable to the needs of each student as AI-based classroom technology becomes available. By providing a more interactive, comfortable and personalized environment for learning, AI-based systems can assist teachers in managing classroom technology, improving student engagement and creating an environment where the physical and digital space is optimized for learning (Mayer, 2021).

Smart classrooms: AI-enabled smart classrooms will automatically adjust factors such as lighting, temperature, air quality and sound levels within the classroom to optimize learning. With real-time feedback from students and classroom activities, AI-enabled smart classrooms will help improve student concentration, focus and overall classroom productivity (Plass et al., 2020).

Intelligent whiteboards: AI-enabled whiteboards will have the ability to identify handwritten texts, convert notes to digital content, and add multimedia elements such as video, animation and interactive activities to enhance lesson delivery, which will allow both teachers and students to store, share, and cooperate with lesson content much faster and easier.

Virtual class assistants: Teachers will receive support from virtual AI assistants who will respond to student inquiries regading classroom task organization, schedule management and classroom technology. Virtual AI assistants will also be able to provide students with additional explanations and assistance when needed during lessons.

Augmented reality support: The integration of augmented reality into classrooms via AI will allow students to engage with three-dimensional models, simulations and digital objects. Students will be able to explore theories and examine models and examples using immersive and interactive learning experiences that lead to greater understanding and higher levels of commitment, dedication, and inclusion (Compton et al., 2017).

Individualized learning environments: Through the use of AI, individualized learning environments will be created for each student based upon his/her preference for physical and digital space. Factors such as seat placement, lighting, sound levels and instructional format will be able to be tailored to meet the needs of each student in order to facilitate a more comfortable and effective way to learn (Ketelhut et al., 2010).

(8) Teacher support and professional development: AI will assist educators in several ways, including reducing the burden of work, enhancing instructional planning, and providing individualized professional development opportunities. AI systems can aid teachers in evaluating their students' performance in the classroom, create instructional plans faster and more effectively, and identify high-quality instructional materials. Instead of replacing educators, AI will act as a tool to enhance the overall effectiveness of educator's instruction and increase the amount of time educators spend interacting with their students and focusing on student learning in meaningful ways (Fullan et al., 2020).

Personalized professional development using AI: Using AI, teachers' strengths, weaknesses, and career aspirations will be used to determine personalized professional development opportunities. Educators may be offered recommendations for workshops, training programs and instructional materials to develop or strengthen particular areas of expertise such as classroom management, integrating technology into the classroom, or instructional strategies (Darlin-Hammond et al., 2017).

Automated development of lesson plans: Educators will input learning objectives and AI systems will create detailed lesson plans, classroom activities, assessments and instructional strategies. AI-created lesson plans can then be modified based upon the various student abilities and needs within a given classroom. As such, AI-generated lesson plans will save educators considerable amounts of time on creation and development, and thus enhance the overall quality of learning.

Classroom performance assessment using AI: Using AI, teachers will evaluate classroom performance through the assessment of student engagement, participation, and academic performance. Furthermore, teachers will receive insight into which aproaches and techniques are most effective, as well as suggestions for enhancing classroom instruction and student investment (Zhao, 2012).

Instantaneous feedback from AI regarding pedagogy: Teachers will receive real-time feedback regarding their instructional style, pacing of lessons, communication methods and classroom interactions. By doing this continuosly, they have the opportunity to constantly refine their instructional methods and enhance classroom performance over time. In other words, it will prove to be an effective form of sustained reflective practice (Perrenoud, 2000).

Curating content for educators using AI: Using AI, teachers will be able to readily locate and arrange quality educational content (i.e., tasks, activities, lessons, materials, etc.). Quality educational content curated using AI will be aligned with curriculum objectives, plus student requirements and student learning styles, thus enhancing the efficiency of planning and then executing effectively in the classroom (Luckin, 2018).

(9) Enhanced assessment: The use of AI within education will allow for assessments to be more personal, efficient, and accurate. The implementation of AI into education allows for teachers to have a better understanding of how their students are doing through consistent monitoring of their progress, providing instant feedback, and adapting assessments to meet the specific needs of each individual learner. As such, teachers can use this information to support the learning process in a much more effective way (OECD, 2021; Fishman et al, 2011).

Real-time assessment: AI will be able to track student learning throughout the course of a lesson or activity, providing teachers with immediate information regarding whether or not their students understand what they are learning, as well as what their students may be struggling with (Bennett, 2015).

Personalized examinations: AI will be able to create personalized exams for each student based upon their own personal learning history and current skill levels, which will enable teachers to evaluate their students' performance in a more objective manner (Baker & Barton, 2004).

Adaptive testing: With the use of AI, teachers can adjust the difficulty of questions posed to students based upon their responses. Therefore, teachers will receive a much more accurate representation of their students' abilities and challenges (Hattie & Timperley, 2007).

Grading and instant feedback: With the use of AI, teachers will be able to provide students with immediate grades and detailed feedback on assignments. By providing students with these, students will be able to improve at a faster pace while simultaneously reducing the workload placed on teachers.

Competency-based assessment: With the use of AI, teachers will be able to assess students based upon their ability to master certain skills and knowledge rather than solely on the amount of time they spend in a classroom setting.

(10) Data-driven education: Artificial intelligence will enable educational institutions to better utilize their data to enhance teaching, learning, and decision-making. Through analysis of students' performances, participation in classes and activities, AI systems can determine students' learning styles, identify potential areas of difficulty, and provide valuable information that will allow teachers to assist students more effectively. Additionally, the use of data-driven education will allow schools to take immediate action when making educational decisions, which will allow schools to tailor educational experiences for each student (Corrin & de Barba, 2015).

Tracking student progression: AI will continuously track student progression through evaluation of grades, participation in class, assignment completion and other learning experiences. Educators will be able to immediately assess which students require additional support or have demonstrated a need for greater challenge, thereby allowing them to modify their instructional practices to meet each student's specific learning requirements.

Adjusting curricula: Based upon student performance and classroom data, AI will recommend adjustments to the curriculum. If a large number of students are having difficulty understanding particular subject matter, AI may recommend alternative methods of delivering content, supplementary materials, or modifications to the curriculum itself in an effort to improve learning outcomes (Siemens & Gasevic, 2012).

Predicting outcomes: By evaluating patterns in students' attendance records, behavioral characteristics and academic performance, AI will be able to predict which students may fall behind. Schools will then be able to implement early intervention programs such as tutoring, counseling or individualized support before problems escalate.

Using learning analytics dashboards: Using AI-powered dashboards, teachers and administrators will have access to real-time information regarding student progress, engagement, attendance and performance. These dashboard visualizations will assist teachers in making evidence-informed decisions regarding the delivery of instruction, as well as providing continuous feedback on the effectiveness of their instruction (Gasevic et al., 2015).

Enhancing educational insights: Through the processing of vast quantities of educational data, AI will be able to identify trends, patterns and effective instructional strategies. Schools will be able to use this information to develop new instructional approaches, improve learning environments and create more effective and personalized educational experiences for students (Baker & Yacef, 2009).

III. Technology-driven Classrooms: Critical Issues and Challenges

Although there is clearly an abundance of opportunities in using AI to power data-driven educational systems, implementing this type of infrastructure into classroom settings poses some serious challenges. The complexity and human centered nature of education as a whole, including issues such as privacy, ethics, equity, emotional development, and social responsibilities, present a number of obstacles and hindrances. As much as AI may increase efficiency and decision making processes, depending too heavily on data and automation could

have substantial negative impacts if not properly managed. To successfully administer AI-driven education, it will be necessary to establish clear ethical guidelines, provide human oversight of the technology used in education, ensure that the technology foundation is reliable, train educators to effectively use the technology, and consider how the potentially unfamiliar framework impacts students' well-being (Holmes et al., 2019).

Student privacy and data security: One of the primary issues with AI-driven education is the amount of student-related data that is collected and stored, to include academic records, student performance, their levels of engagement, patterns of behavior and emotional states and responses, mental health history, possible learning disability status, (personal) communication, degree of involvement and devotion, emotional responses, and even biometrics. While the collection of these has many benefits, it does pose a significant risk to privacy (Williamson, 2019). Moreover, if this data is not properly protected, students may be subject to identity theft, unauthorized surveillance, discrimination, or improper use of personal data (Noble, 2018).

Cybersecurity threats are also a major concern. Educational institutions have become increasingly attractive targets for hackers due to the large quantity of personal student data contained within educational databases. In the event of a large-scale data breach, confidential student records can be exposed, which can have long-lasting effects on both the student and their family (Livingstone et al., 2019). Who owns the educational data is also a question. Companies that develop AI systems often obtain large quantities of student data. This obviously raises ethical questions regarding the sale of student data to third parties for advertising or other commercial purposes.

Additionally, the potential for corporate interests to influence educational practices through access to large quantities of student data is concerning. In order to mitigate these, educational institutions will need to establish robust data protection laws, implement secure methods of storing student information, develop clear policies concerning student consent for collection, be transparent about what types of records are collected from students, and limit the manner in which details are utilized or shared. In short, without establishing adequate protections for student data, data-driven education could potentially violate student privacy and erode trust on many levels.

(2) Bias and discrimination in AI systems: AI is only as good as the data it is trained on. When an education AI system is trained using biased or incomplete data, it could potentially lead to unfair or discriminatory results (O'Neil, 2016). For example, students who come from low income households could be unfairly identified as "at-risk," minority students could have lower predictive scores due to historical inequality found within the data, AI could inaccurately interpret language patterns, cultural behavior, and/or communication styles, and disabled students could be inaccurately assessed if systems are not designed to allow for access (Benjamin, 2019).

Predictive analysis is particularly problematic because it could inadvertently perpetuate inequalities. If an AI predicts that some students will not do well, then teachers and schools may unknowingly lower their expectations for those students. Therefore, a negative cycle could occur where the prediction influences opportunity and treatment (Buolamwini, 2018). Biases can also be seen in automated grading, behavioral analysis, engagement tracking, and risk prediction models.

Although AI systems appear to be objective, they may actually reflect underlying social and cultural biases. To minimize discriminatory practices in education, schools would need diverse and representative training data, human oversight of AI decisions, regular audits for misjudgements, transparent algorithms, and ethical review systems (Fullan et al, 2020). Put another way, even though safeguards exist, reducing biases completely is still extremely difficult.

(3) Over-reliance on quantifiable data: There are many areas of education that can be measured by AI. However, there are also many components and features where it can get extremely complicated as many important elements of education cannot be evaluated by data alone. Some examples of these include creativity, emotional development, curiosity, leadership skills, empathy, moral development, social relationships, motivation, and resilience.

Schools that rely too heavily on data-based evaluations may create an environment where the focus is solely on performance indicators (e.g. test scores, attendance rates, and productivity metrics). When schools focus only on these, it limits the scope of education and puts less emphasis on developing the whole person. Kohn (2000) states that when schools place too much emphasis on performance indicators, they limit the intended purpose of education. Additionally, when schools do this, they put less emphasis on helping students think critically. Moreover, teachers may also feel pressure to teach in a way that allows them to assess students' learning through performance indicators. This type of teaching may cause teachers to lose sight of their overall goal of providing all students with a well-rounded education. When teachers are forced to teach based upon performance indicators, they may begin to view each student as a collection of data points rather than seeing each person as an individual with unique emotional and social needs. Teachers have the ability to recognize context, personality, emotional struggles, and even family situations. In essence, while data can help provide additional information about students, it cannot replace human understanding and professional judgment.

(5) Inaccurate predictions and misinterpretation: Predictive AI systems are far from perfect. Even when they successfully recognize patterns in student performance, predictive AI systems can still make inaccurate

predictions (Domingos, 2015). Examples include temporary drops in grades that can be incorrectly perceived as long-term academic risks, short-term personal issues that can be unfairly categorized, failure to see students' hidden talents or the possibility for students' future improvements, and deviations from typical learning patterns (Angrist & Pischke, 2009).

The potential for incorrect predictions has serious implications for schools that use predictive AI systems to inform their decision-making. Students could end up being placed into inappropriate support programs, miss out on important learning opportunities and/or be stigmatized due to inaccurate data analysis (Selbst & Barocas, 2018).

Furthermore, a "self-fulfilling prophecy" also exists. Teachers who place too much faith in predictive AI system's predictions may unintentionally act toward students in ways that align with their expectations (Gabrielli, 2016). Therefore, human judgment is necessary because teachers can take into consideration a variety of factors that predictive AI systems cannot.

(6) Teacher resistance and lack of training: Many teachers might hesitate to utilize AI systems, particularly when they do not have sufficient experience or knowledge of how to operate such technology. There is also a possibility that they may be concerned about losing some of their freedom as professionals or having their roles reduced.

As educators are currently working under extreme pressure from large workloads, utilizing new and possibly complicated AI systems will likely cause additional stress during the early stages of adoption (Fullan, 2013). Common concerns related to the utilization of AI systems by educators may include difficulties with learning to understand how to effectively use them, fears of being monitored or evaluated by this technology, lack of confidence in automated recommendations, concerns about the loss of human-centric teaching methods, and inadequate technical assistance (Peggy & Ottenbreit-Leftwich, 2010).

If educators are not provided with sufficient training, there is a strong chance that they may utilize AI systems incorrectly or overly depend on them without fully understanding their limitations (Cuban, 2001). For the successful integration of AI systems into the educational process, it will be necessary to provide comprehensive professional development opportunities, sustained technical assistance, clearly defined ethical guidelines, teacher input into the design of AI systems, and an equal balance of AI-based and human instruction (Lei & Warschauer, 2015; Becker 2000). Bottom line: AI systems should assist teachers, not diminish their professional capabilities.

(7) Inequality and unequal access: AI-driven education requires a large amount of technology and infrastructure for deployment. Some of this technology includes high-speed internet, computer expertise, knowledge of software systems, provion of technical support, and the ability to properly train faculty members. There are many schools in low-income and/or rural areas that do not possess all of these items. Therefore, there is an increased risk of educational disparities between schools in wealthier and poorer communities (Marin & Warschauer, 2015). Students who come from low-income households may also have limited access to technology in the home. As a result, they will be unable to take full advantage of AI-powered learning systems outside of school. Furthermore, some countries and/or regions with fewer economic means may be limited in their ability to provide the necessary technology for AI systems. Therefore, there is a possibility that the world will experience greater disparities in educational opportunities (Francis & Mills, 2012).

(8) High financial costs: Large scale adoption of AI in the education field can be very expensive. Hardware and software, building secure data systems, teacher training, tecchnical support and maintenance, cyber security protection, and updating outdated infrasture on a regular basis are examples of likely expenses (Picciano, 2019). Schools operating with limited budgets could find it difficult to afford new AI technologies if they are already struggling to meet their basic educational needs. Moreover, it’s possible that some schools may rely too heavily on private technology companies to provide their educational services. This could result in long-term financial and ethical concerns (Schleicher, 2019).

(9) Loss of human interaction: Students will be able to learn better with human connections. In fact, one of the most effective ways to teach is to have an enriching rapport with students. Put another way, relationships can help students become more motivated, feel supported emotionally and socially, and encourage each other.

The use of technology in the classroom has many benefits, but the over-reliance on AI can negatively impact student-teacher and student-peer relationships, students' emotional connections with their classmates, the opportunity to engage in social learning experiences, compassion, inspiration, empathy, and human understanding (Noddings, 2005). Therefore, if the classroom becomes too focused on data and automation, students may begin to perceive their educational experience as being overly impersonal (Jarvis, 2007) .Because of this, it is imperative for teachers to continue to serve as the central figure in the education process as human relationships are vital to the development of students' ability to learn and grow.

(10) Ethical governance and accountability: Many of the toughest questions regarding the use of AI in education involve identifying responsibility for mistakes or harm caused by AI systems. The answers to these questions will define whether students have rights and protections from AI decision making: What are the implications of incorrect predictions? Who will determine how students’ data is utilized? To what degree do AI

systems need to be transparent? How can students dispute AI decisions? What regulatory body would oversee the development and deployment of educational AI applications? (Chadwick & Kavanaugh, 2011).

Many AI systems function as "black boxes, which means that their decision-making processes are often opaque, even to those who develop them. The absence of transparency may lead to a lack of confidence among schools, teachers, parents, and students in trusting AI recommendations (Wallach & Allen, 2009). Therefore, a strong framework for regulating the ethics of AI will be required to ensure that AI systems remain equitable, transparent, accountable, and compatible with the value systems that support education. A failure to regulate and monitor AI-driven education carefully may result in an overemphasis on maximizing efficiency and collecting data, which has the potential to undermine student well-being, equity, and the human-centered nature of learning (Floridi, 2013).

IV. CONCLUSION

The role of artificial intelligence in education will provide tremendous opportunities and significant challenges. The application of AI to develop new technologies to deliver education offers many ways to enhance the classroom experience. AI can assist educators in providing a more individualized approach to teaching and learning by increasing the effectiveness of the educational process, making education available to all students regardless of location or financial status, and quickly adapting to meet students' changing needs. However, by using AI to assess student progress on an ongoing basis, it will necessitate the utilization of predictive analytics to anticipate problems before they occur, customization of the curriculum based upon individual students' strengths and weaknesses, provisions of real-time assistance through various forms of AI-powered support systems, an alleviation of administrative burdens, and the creation of more responsive educational settings.

While there are a number of promising opportunities presented by utilizing AI within the educational system, integrating such technology into the classroom environment is far more complicated than simply adding cutting-edge technology. In other words, education is not solely concerned with transmitting knowledge or increasing efficiency. Rather, education is a highly complex human activity involving emotional development, interpersonal communication, moral growth, creative expression, critical thinking skills, and the building of meaningful relationships. Due to the complexity of the educational process, the integration of AI into education should be done with care, responsibility, and thoughtfulness.

One of the most concerning aspects of AI in education is the issue of privacy and data security. The use of data-driven education systems involves the collection and analysis of a large amount of student information such as academic performance, behavior patterns, emotional cues, attendance records, and in some instances biometric data. If there are no adequate safeguards to protect these types of information, it could be misused, stolen due to security breaches, or accessed by other organizations. Therefore, both students and their families must have confidence that the students' personal information is protected and utilized in an ethical manner.

In addition to privacy and data security, bias and fairness pose additional issues. Since AI systems draw upon past information. If this contains evidence of current social inequity or discrimination, then AI systems have the potential to reinforce these issues. For this reason, students who come from low income areas, belong to minority groups, or have disabilities may be miscategorized or misjudged based on predictions made by AI systems which do not consider the uniqueness of each student's situation. Therefore, if humans do not provide oversight to the AI system, it may lead to disparities in opportunity and negative educational outcomes.

Another major problem is the increasing potential for overly intrusive surveillance in schools. Many AI systems use ongoing monitoring via camera, software to track behavior, facial recognition technology and tools to assess student engagement. Although these technologies have the potential to enhance learning and safety at school, they also create some serious ethical issues related to students' rights to privacy, their ability to make choices independently (i.e. autonomy) and their mental health (or emotional well-being).

While AI systems are very powerful tools for education, they clearly can't completely replace human understanding, empathy, judgement and emotional connections. Learning is much greater than just academic achievement. Teachers assist students in building confidence, developing their character, navigating emotional challenges, and forming social relationships that could last a lifetime.

Furthermore, there are several barriers that schools will encounter when attempting to use advanced AI systems. Implementing these systems require a great deal of money and technology, which can create greater disparities in education based on wealth and funding. Unfortunately, as long as some schools have more access to technology and resources than others do, AI will continue to create inequities in education.

The preparation of teachers and the provision of professional support to them will also be key. Educators must receive training to responsibly and effectively utilize AI systems. Teachers should have an understanding of the advantages and disadvantages of using AI. Having such knowledge will allow teachers to make educated decisions about this powerful technology. However, educators must not become so reliant upon automated recommendations that it replaces their ability to think for themselves. AI must enhance the professionalism of educators and not diminish their autonomy.

The future of education must not solely rely upon using AI to replace the role of human educators as they do much more than just provide information to students; they serve as role models, mentors, motivators, caregivers, and leaders, and assist students in developing their intellect and emotions.

Relationships are a fundamental part of an effective education. The most effective future classrooms will likely incorporate the best aspects of both human educators and AI tools. Undoutedly, Al can provide educators by helping to analyze data, personalize instruction, organize materials, and complete routine tasks.

Educators will continue to provide students with the creativity, ethical guidance, emotional support, motivation, and human interaction that is needed for students to learn. Through this balanced approach of incorporating technology into education, AI can be utilized to improve education without eliminating the value-added element of human involvement in education.

The end result of using AI in education should not be to develop fully automated classrooms. Rather, it should be to create more supportive, inclusive, equitable and effective learning environments for students. To ensure AI is being used in a responsible manner by both students and teachers, careful regulation, ethical safeguards, transparency and human oversight will need to be in place. If the implementation of AI occurs with thought and consideration, then AI could serve as an important educational resource that will enhance both teaching and learning while maintaining the humanistic aspects of education.

REFERENCES

[1] Angrist, J., & Pischke, J. S. (2009). Mostly harmless econometrics: An empiricist's companion. Princeton University Press.

[2] Bailenson, J. N. (2018). Experience on demand: What virtual reality is, how it works, and what it can do. W. W. Norton & Company.

[3] Baker, E. L., & Barton, P. E. (2004). Constructing valid measures of educational achievement. Educational Testing Service.

[4] Baker, R. S., & Yacef, K. (2009). The state of educational data mining in 2009: A review and future visions. *Journal of Educational Data Mining, 1*(1), 3–17.

[5] Becker, H. J. (2000). Who's wired and who's not: Children's access to and use of computer technology. *The Future of Children, 10*(2), 44–75.

[6] Belpaeme, T., Kennedy, J., Ramachandran, A., Scassellati, B., & Tanaka, F. (2018). Social robots for education: A review. *Science Robotics, 3*(21), 42-59.

[7] Benjamin, R. (2019). Race after technology: Abolitionist tools for the new Jim code. Polity Press.

[8] Bennett, R. E. (2015). The changing nature of educational assessment. *Review of Research in Education, 39*(1), 370–407.

[9] Biesta, G. (2010). Good education in an age of measurement: Ethics, politics, democracy. Paradigm Publishers.

[10] Biswas, G., Leelawong, K., Schwartz, D., & Vye, N. (2005). Learning by teaching: A new agent paradigm for educational software. *Applied Artificial Intelligence, 19*(3–4), 363–392.

[11] Boulay, B. (2016). Artificial intelligence as an effective classroom assistant. *IEEE Intelligent Systems, 31*(6), 76–81.

[12] Breazeal, C., Dautenhahn, K., & Kanda, T. (2016). Social robotics. In B. Siciliano & O. Khatib (Eds.), *Springer handbook of robotics* (2nd ed., pp. 1935–1972). Springer.

[13] Buolamwini, J., & Gebru, T. (2018). Gender shades: Intersectional accuracy disparities in commercial gender classification. *Proceedings of Machine Learning Research, 81*, 1–15.

[14] Calvo, R. A., & D'Mello, S. (2010). Affect detection: An interdisciplinary review of models, methods, and their applications. *IEEE Transactions on Affective Computing, 1*(1), 18–37.

[15] Chadwick, R., & Kavanagh, D. (2011). Ethical issues in information systems development and implementation. *Journal of Business Ethics, 103*(2), 213–226.

[16] Corrin, L., & de Barba, P. (2015). How do students interpret feedback delivered via dashboards? In *Proceedings of the Fifth International Conference on Learning Analytics and Knowledge* (pp. 430–431). Association for Computing Machinery.

[17] Crawford, K. (2021). Atlas of AI: Power, politics, and the planetary costs of artificial intelligence. Yale University Press.

[18] Crompton, H., Burke, D., & Gregory, K. H. (2017). The use of mobile learning in science: A systematic review. *Journal of Science Education and Technology, 26*(2), 149–160.

[19] Cuban, L. (2001). Oversold and underused: Computers in the classroom. Harvard University Press.

[20] D'Mello, S. K., & Graesser, A. (2012). Dynamics of affective states during complex learning. *Learning and Instruction, 22*(2), 145–157.

[21] Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). Effective teacher professional development. Learning Policy Institute.

[22] de Laat, M., & Lally, V. (2003). Complexity, theory and praxis: Researching collaborative learning and tutoring processes in a networked learning community. *Instructional Science, 31*(1–2), 7–39.
[23] Dillenbourg, P. (2016). The evolution of research on digital education. *International Journal of Artificial Intelligence in Education, 26*(2), 544–560.
[24] Domingos, P. (2015). The master algorithm: How the quest for the ultimate learning machine will remake our world. Basic Books.
[25] Eubanks, V. (2018). Automating inequality: How high-tech tools profile, police, and punish the poor. St. Martin's Press.
[26] Fishman, B. J., Means, B., Dede, C., & Eisenkraft, A. (2011). Teaching and technology: New tools for new times. In K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (2nd ed., pp. 515–541). Cambridge University Press.
[27] Floridi, L. (2013). The ethics of information. Oxford University Press.
[28] Francis, B., & Mills, M. (2012). Education, social class and social mobility. Palgrave Macmillan.
[29] Fullan, M. (2013). Stratosphere: Integrating technology, pedagogy, and change knowledge. Pearson.
[30] Fullan, M., Quinn, J., Drummy, M., & Gardner, M. (2020). Education reimagined: The future of learning. Corwin Press.
[31] Gabrieli, J. D. E. (2016). Neuroscience and education: A bridge too far? *Trends in Neuroscience and Education, 5*, 1–7.
[32] Gašević, D., Dawson, S., & Siemens, G. (2015). Let's not forget: Learning analytics are about learning. *TechTrends, 59*(1), 64–71.
[33] Gebru, T., & Buolamwini, J. (2018). Gender shades: Intersectional accuracy disparities in commercial gender classification. *Proceedings of Machine Learning Research, 81*, 1–15.
[34] Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research, 77*(1), 81–112.
[35] Holmes, W., Bialik, M., &Fadel, C. (2019). Artificial intelligence in education: Promises and implications for teaching and learning. Center for Curriculum Redesign.
[36] Ifenthaler, D., & David Gibson, D. C. (2019). Adoption of learning analytics in higher education learning and teaching: A systematic review. *Educational Technology Research and Development, 67*(5), 1211–1235.
[37] Jarvis, P. (2007). Globalisation, lifelong learning and the learning society. Routledge.
[38] Jenkins, H. (2009). Confronting the challenges of participatory culture: Media education for the 21st century. MIT Press.
[39] Kallick, B., & Allison Zmuda, A. (2017). Students at the center: Personalized learning with habits of mind. ASCD.
[40] Ketelhut, D. J., Nelson, B. C., Clarke, J., & Dede, C. (2010). A multi-user virtual environment for building and assessing higher order inquiry skills in science. *British Journal of Educational Technology, 41*(1), 56–68.
[41] Kohn, A. (2000). The case against standardized testing: Raising the scores, ruining the schools. Heinemann.
[42] Kress, G. (2010). Multimodality: A social semiotic approach to contemporary communication. Routledge.
[43] Lane, H. C., Howard, M., Swanlund, A., & Dieker, L. (2021). Addressing learning disabilities with artificial intelligence and emerging technologies. *Intervention in School and Clinic, 56*(5), 280–288.
[44] Lei, T., & Warschauer, M. (2015). Digital divide in education. *Journal of Language, Identity & Education, 14*(2), 1–15.
[45] Livingstone, S., Stoilova, M., & Nandagiri, R. (2019). Children's data and privacy online: Growing up in a digital age. London School of Economics and Political Science.
[46] Luckin, R. (2018). Machine learning and human intelligence: The future of education for the 21st century. UCL Institute of Education Press.
[47] Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). Intelligence unleashed: An argument for AI in education. Pearson Education.
[48] Marín, R., & Warschauer, M. (2015). Digital literacy and digital inclusion. University of California Press.
[49] Mayer, R. E. (2021). Multimedia learning (3rd ed.). Cambridge University Press.
[50] Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record, 108*(6), 1017–1054.
[51] Mitchell, T. M. (1997). Machine learning. McGraw-Hill.
[52] Noble, S. U. (2018). Algorithms of oppression: How search engines reinforce racism. New York University Press.
[53] Noddings, N. (2005). The challenge to care in schools: An alternative approach to education (2nd ed.). Teachers College Press.

[54] O'Neil, C. (2016). Weapons of math destruction: How big data increases inequality and threatens democracy. Crown Publishing Group.
[55] OECD. (2021). Digital education outlook 2021: Pushing the frontiers with artificial intelligence, blockchain and robots. OECD Publishing.
[56] Okita, S. Y. (2014). Learning from robotic teachers. *Journal of Educational Technology & Society, 17*(4), 376–387.
[57] Picard, R. W. (1997). Affective computing. MIT Press.
[58] Picciano, A. G. (2019). Educational leadership and planning for technology. Routledge.
[59] Plass, J. L., Homer, B. D., & Kinzer, C. K. (2015). Foundations of game-based learning. *Educational Psychologist, 50*(4), 258–283.
[60] Plass, J. L., Homer, B. D., Mayer, R. E., & Kinzer, C. K. (2020). Immersive virtual reality in education: A review of design principles and learning outcomes. *Educational Psychology Review, 32*(3), 1–35.
[61] Quinn, C. N. (2013). The mobile academy: Learning for higher education. Jossey-Bass.
[62] Romero, C., & Ventura, S. (2020). Educational data mining and learning analytics: An updated survey. *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery, 10*(3), e1355.
[63] Schleicher, A. (2019). PISA 2018 insights and interpretations. OECD Publishing.
[64] Selbst, A. D., & Barocas, S. (2018). The intuitive appeal of explainable machines. *Fordham Law Review, 87*(3), 1085–1139.
[65] Selwyn, N. (2019). Should robots replace teachers? AI and the future of education. Polity Press.
[66] Selwyn, N., & Facer, K. (2014). The politics of education and technology: Conflicts, controversies, and connections. Palgrave Macmillan.
[67] Shaffer, D. W. (2017). Quantitative ethnography. Cathcart Press.
[68] Siemens, G., & Dragan Gašević, D. (2012). Guest editorial – Learning and knowledge analytics. *Educational Technology & Society, 15*(3), 1–2.
[69] Siemens, G., & Baker, R. S. (2012). Learning analytics and educational data mining: Towards communication and collaboration. In *Proceedings of the 2nd International Conference on Learning Analytics and Knowledge* (pp. 252–254). Association for Computing Machinery.
[70] Thomas, M., Reinders, H., & Warschauer, M. (2013). Contemporary computer-assisted language learning. Bloomsbury Academic.
[71] Tlili, A., Huang, R., Bond, M., Burgos, D., Zhou, Z., & Jemni, M. (2021). Impact of artificial intelligence on learners in education: A review of empirical studies. *Computers and Education: Artificial Intelligence, 2*, 100-142.
[72] Turkle, S. (2011). Alone together: Why we expect more from technology and less from each other. Basic Books.
[73] UNESCO. (2021). AI and education: Guidance for policy-makers. UNESCO Publishing.
[74] Wallach, W., & Allen, C. (2009). Moral machines: Teaching robots right from wrong. Oxford University Press.
[75] Williamson, B. (2017). Big data in education: The digital future of learning, policy and practice. SAGE Publications.
[76] Williamson, B., & Eynon, R. (2020). Historical threads, missing links, and future directions in AI in education. *Learning, Media and Technology, 45*(3), 223–235.
[77] Woolf, B. P. (2010). Building intelligent interactive tutors: Student-centered strategies for revolutionizing e-learning. Morgan Kaufmann.
[78] Zuboff, S. (2019). The age of surveillance capitalism: The fight for a human future at the new frontier of power. Public Affairs.