White paper - **A**rtificial **I**ntelligence **t**o **I**mprove Education / **L**earning **C**hallenges

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ABSTRACT: "Education is the most powerful weapon which you can use to change the world." - **Nelson Mandela**

In educational system, handling artificial intelligence (AI), in teaching and learning process, had a surprising evolution. The educational goals can be better achieved and managed by new technology of education. Using AI we can have better analysis of each and every students in a class who is a slow learner or lazy enough to understand the topics which has been explained by lecturer. Analysis will give clear idea about student's understanding on each and every topic. If student is lagging in some areas or he/she is not able to understand few topics then AI analysis would showcase this report to lecturer or teacher or parents so that appropriate action can be taken. AI analysis should also recommend the topics with basic examples or in an easy manner to student so that he/she can improve his/her skill in the particular area where he/she is uncomfortable.

Key Words: Artificial Intelligence; face value, Teaching and learning Process

1. INTRODUCTION

Artificial Intelligence can point out places where courses need to improve. Teachers may not always be aware of gaps in their lectures and educational materials that can leave students confused about certain concepts. Different students have different learning styles, abilities, interests and needs. One teacher in a classroom of 30 students will rarely be able to cater to each of those needs. Homework and classes could be customized based on a student profile, interests can be cultivated and enhanced by exposing students to different courses and content. [2] Artificial Intelligence offers a way to solve that problem. For an instance, Coursera, a massive open online course provider, is already putting this into practice. When a large number of students are found to submit the wrong answer to a homework assignment, the system alerts the teacher and gives future students a customized message that offers hints to the correct answer. This type of system helps to fill in the gaps in explanation that can occur in courses, and helps to ensure that all students are building the same conceptual foundation. Rather than waiting to hear back from the professor, students get immediate feedback that helps them to understand a concept and remember how to do it correctly the next time around.

Here are just a few of the ways those tools, and those that will follow them, will shape and define the educational experience of the future.

1. **Artificial intelligence can automate basic activities in education, like grading.**

In college, grading homework and tests for large lecture courses can be tedious work, even when TAs split it between them. Even in lower grades, teachers often find that grading takes up a significant amount of time, time that could be used to interact with students, prepare for class, or work on professional development. While AI may not ever be able to truly replace human grading, it's getting pretty close. It's now possible for teachers to automate grading for nearly all kinds of multiple choice and fill-in-the-blank testing and automated grading of student writing may not be far behind. Today, essay-grading software is still in its infancy and not quite up to par, yet it can (and will) improve over the coming years, allowing teachers to focus more on in-class activities and student interface than grading.

2. Students could get additional support from AI tutors.

While there are obviously things that human tutors can offer that machines can't, at least not yet, the future could see more students being tutored by tutors that only exist in zeros and ones. Some tutoring programs based on artificial intelligence already exist and can help students through basic mathematics, writing, and other subjects.

These programs can teach students fundamentals, but so far aren't ideal for helping students learn high-order thinking and creativity, something that real-world teachers are still required to facilitate. Yet that shouldn't rule out the possibility of AI tutors being able to do these things in the future. With the rapid pace of technological advancement that has marked the past few decades, advanced tutoring systems may not be a pipe dream.

3. AI-driven programs can give students and educators helpful feedback.

AI can not only help teachers and students to craft courses that are customized to their needs, but it can also provide feedback to both about the success of the course as a whole. Some schools, especially those with online offerings, are using AI systems to monitor student

progress and to alert professors when there might be an issue with student performance.

These kinds of AI systems allow students to get the support they need and for professors to find areas where they can improve instruction for students who may struggle with the subject matter. AI programs at these schools aren't just offering advice on individual courses, however. Some are working to develop systems that can help students to choose majors based on areas where they succeed and struggle. While students don't have to take the advice, it could mark a brave new world of college major selection for future students.

4. AI could change the role of teachers.

There will always be a role for teachers in education, but what that role is and what it entails may change due to new technology in the form of intelligent computing systems. As we've already discussed, AI can take over tasks like grading, can help students improve learning, and may even be a substitute for real-world tutoring. Yet AI could be adapted to many other aspects of teaching as well. AI systems could be programmed to provide expertise, serving as a place for students to ask questions and find information or could even potentially take the place of teachers for very basic course materials. In most cases, however, AI will shift the role of the teacher to that of facilitator.

Teachers will supplement AI lessons, assist students who are struggling, and provide human interaction and hands-on experiences for students. In many ways, technology is already driving some of these changes in the classroom, especially in schools that are online or embrace the flipped classroom model.

5. AI can make trial-and-error learning less intimidating.

Trial and error is a critical part of learning, but for many students, the idea of failing, or even not knowing the answer, is paralyzing. Some simply don't like being put on the spot in front of their peers or authority figures like a teacher. An intelligent computer system, designed to help students to learn, is a much less daunting way to deal with trial and error. Artificial intelligence could offer students a way to experiment and learn in a relatively judgment-free environment, especially when AI tutors can offer solutions for improvement. In fact, AI is the perfect format for supporting this kind of learning, as AI systems themselves often learn by a trial-and-error method.

6. AI may change where students learn, who teaches them, and how they acquire basic skills.

While major changes may still be a few decades in the future, the reality is that artificial intelligence has the potential to radically change just about everything we take for granted about education. [2]

Using AI systems, software, and support, students can learn from anywhere in the world at any time, and with these kinds of programs taking the place of certain types of classroom instruction, AI may just replace teachers in some instances (for better or worse). Educational programs powered by AI are already helping students to learn basic skills, but as these programs grow and as developers learn more, they will likely offer students a much wider range of services.

2. PROBLEM STATEMENT

In a teaching and learning environment, students' active participation with lessons as well as the use of learning approaches that help students remember what they learn are important dimensions. Effective learning approaches increase the quality of learning. Students learn best by doing and experiencing. To be effective and efficient, science teaching programs need to be student-centered and based on research and investigation, and should include experimental activities. In a cooperative learning approach, student and teachers are in a state of dynamic interaction in the classroom.

Each students' have different learning ability. One example of a topic explained by a teacher can be understand by student in one go or it will take more than two or three example of the same topic to understand the topic. Sometimes, it might happen that student was absent for the previous class. Sometimes, teacher is not able to give appropriate example which is easy enough to understand by each and every student in a classroom.

3. IDENTIFYING PATTERNS

Teachers who are able to embrace technology as a foundation for their teaching strategy can reap the benefits of automatic data capture created from their students' engagement. The big advantage of digital information systems is their ability to store and rapidly process huge amounts of information in a short space of time.

Combined with specialized algorithms, these systems are able to identify and make sense of student engagement and behavioral patterns that emerge in a teacher's class and report these findings to the teacher.

The ability for educators to be assisted by technology in the management of their classes means that they can spend less time pencil-pushing and more time gaining useful insights from their classroom AI tools to deliver higher standards of teaching.

4. THE PROCESS OF LEARNING AND TEACHING

[5] To learn and teach is main problem of a knowledge - oriented society, and its procedure to solve can be affect

the future of each country. Optimum solving of teaching and learning must be done, based on dominant culture and values in the society. The model of teaching and learning must pose as suitable as with society
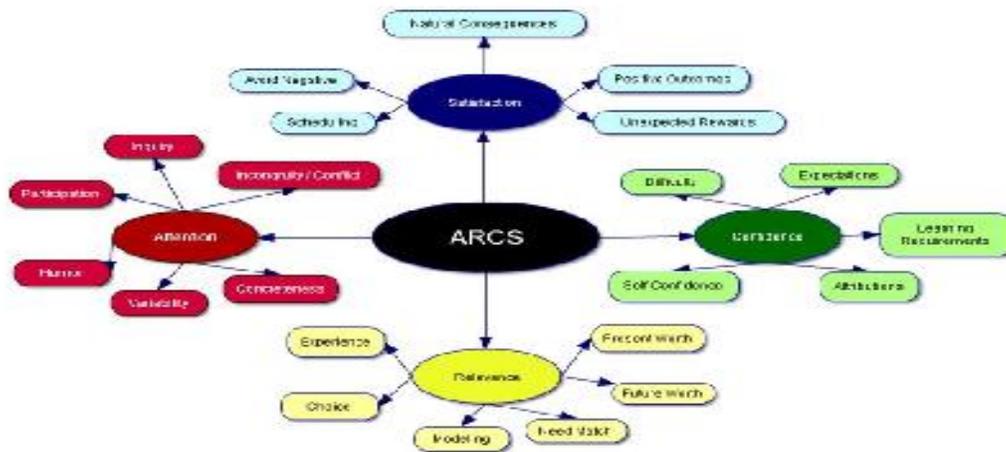

Fig 1 Keller's' motivator didactic model (ARCS)

Various models have presented, including Keller learning model (ARCS). Keller believes that, motivation is under effect of individual, environmental, specialties and learning materials. Keller, in his motivational, educational designing, composing theories and motivational procedures with educational designing, and forms an application result that causes learners to do more struggle to achieve educational goals EQ emotional model. This model e motion or feeling has much effect on learning Sam 2009. After making emotional remembrance as compare with text reports, that essential motive comes manifest the emotional model of human is, as a positive spectrum of emotions like joy, pleasure, hope and sympathy and negative spectrum consist of sadness, anger, fear disappointment and aggressiveness, emotion in the procedure of education must be in positive spectrum and preferably must be in the form of active and several of learning model which must take care to archive goals.
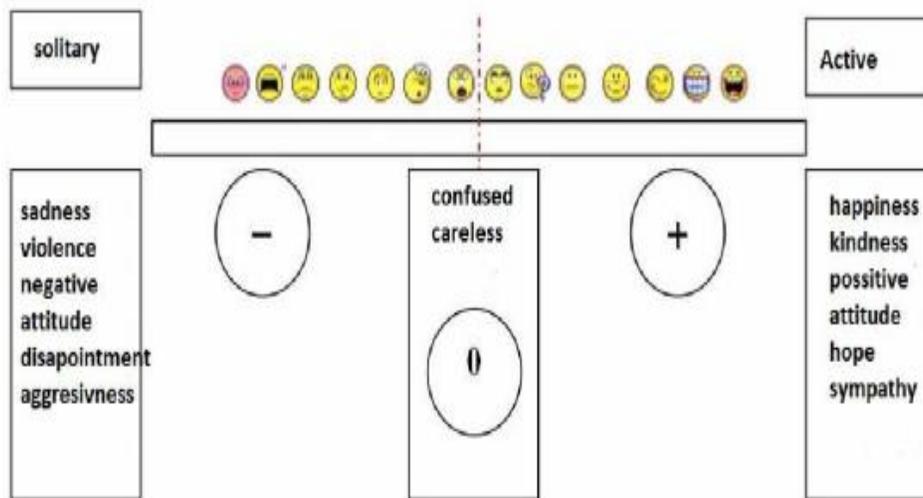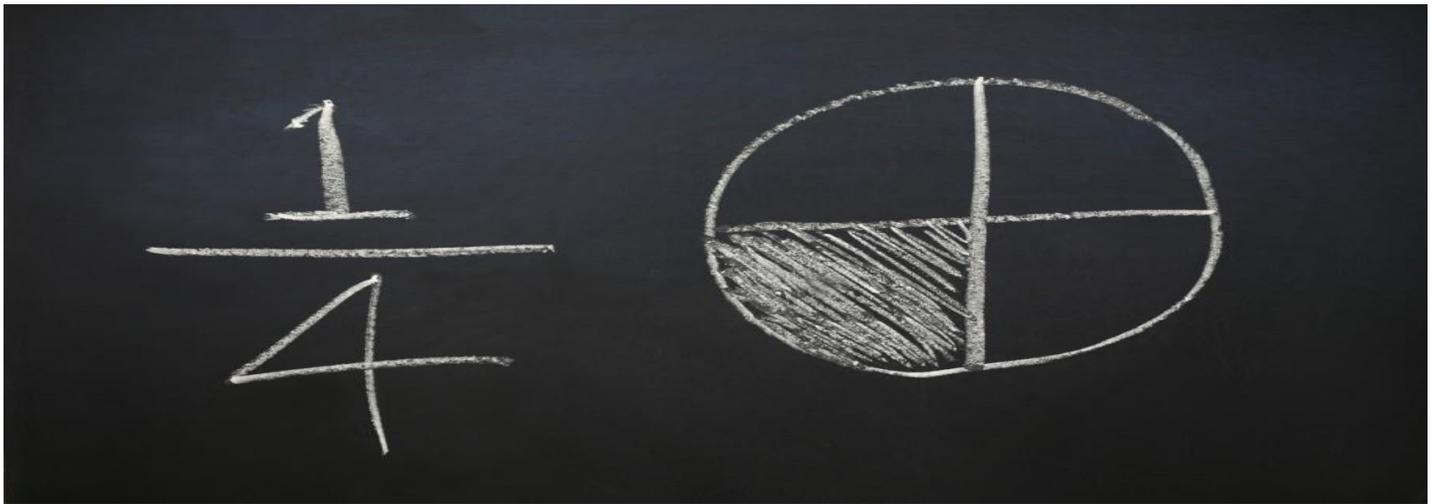

Fig 2 Excitement Model (EQ) [5]

5. THE AI PROCESS

[2] An example scenario of a teacher's interaction with their classroom AI tools could be as follows:

Teacher: Show me the students who have difficulty understanding fractions.

AI: I have found 14 students who show three categories of difficulty in understanding fractions. [Shows list of students]

Teacher: Why does Amit not understand fractions?

AI: My analysis shows that Amit missed the first lesson where fractions were explained. His interactions suggests that he doesn't understand the concept of fractions.

Teacher: What actions are recommended for Amit's difficulty in fractions?

AI: You should ask your teaching assistant to provide Amit with the information from the first lesson at the earliest opportunity, followed by the provision of homework item A12. [Click this to review]

Teacher: Which other students can these actions be applied to?

AI: Vinayak and Rajesh were also absent from the first fractions lesson, but they are showing better capabilities in understanding the subject.

Teacher: Is tomorrow's lesson plan suitable for these students?

AI: No, because none of the identified students are showing a full understanding of fractions at present. [2]

6. CONCLUSION

The ability for information systems to provide this level of insight not only saves time, but can provide the level of detail that may not be obvious or possible for teachers to recognize at face value. Classroom AI tools have capabilities in analyzing multiple sources of data and comparing them to known patterns. This can identify the root causes for problems, and also drive towards more consistent outcomes across different classes, regardless of the experience of teaching staff.

7. REFERENCES

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