Assignment 1: Synthesis Writing

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1   Introduction

AI with education in the 21st century offers brilliant ways of transporting information more clearly, concisely, concretely. The modern world is devised for extreme diversity, ideals valuing risk thinking, exploration mindset, passion for lifelong learning, all problems that technology attempts to provide solutions for. This essay builds around discussions for developing global educational resources all the way to computationally analyzing student learning patterns, behavioral patterns, cultivating to match personalized pacing. These systems rely on big data processes, facilitating teacher-student interaction, building propositions. Finally, the conclusion ranges to problems still plaguing the AI and Education community, and our attempts to better prepare future generations.

2   Challenges Brought On By AI And Education

AI produces innovation through tutorial dialog, conversational agents, collaborative learning, simulated learners, machine teaching, intelligent tutoring systems, and interaction design. This prolonged, but short diversity of methods, specially Intelligent Tutoring Systems (ITS) have been "shown to improve the educational outcomes of students" [5]. It is not an exaggerated claim to say that AI and technology have significantly influenced our modernist technological views, its roles, purpose, and about giving back to humanity and the people.

Even with the benefits [6], it is currently challenging to build, test, evaluate AI systems, and focus to "address long-term educational goals" [6]. The process requires learning 21st century skills [6], such as man power, specialized technical field, and proper project management. Personalized learning is still a challenge for "student and group experience, reflection, and assessment" [6]. It is plausible to state about AI and say, "very few AI-based learning systems are consistently used in classrooms or homes" [6],

Keeping in mind the ultimate goals of AI, one of them is about learning 21st century skills, [6], including cognitive skills - non-routine problem solving, systems thinking. AI wants to capture some characteristics that are intra-personal skills - self management, self-development, active listening, conflict resolution [6].

Such software, as in the ITS mentioned earlier, exists and is capable of model transparency, input flexibility and problem solving control [5]. Achieving valuable production rules is valuable, and takes time to experiment and build upon [6] [5]. Mastery is not a "concern" [6] [3], but it's rather to take a student through an iterative learning process is development worthy [5]. Even getting proper arithmetic correct has been considered rigorous and resource intensive. Some users claim AI agents are 'dumb' - unable to remove mistakes [5].

AI needs no explicit requirements for physical classrooms. Virtual learning has proliferated[2], with a need to describe "the architecture" [2] with the idea of an "information space"[2]. The next question is to ask if AI can advance this "information space" to "lifelong learning"[6].

3   Collaborative Learning AI Environments

AI has proven to be effective for dealing with individuals, but it has often struggled with multi-student groups [3]. Ongoing research for Automated Tutors with multi-students, are being looked into. Demos have shown a grade improvement[3]. For the AI, students abuse / ignore the tutor, which forces the software to diverge from focusing on single individuals, to splitting its focus at everyone concurrently. Such topic(s) deal with a variety of interaction and collaborative learning patterns [4][3].

Collaborative Learning in AI and its benefits are only achieved by active, well-functioning teams[4]. This method drives design, development, of tools to automate coding, for aid conversation analysis[4] [6]. Collaboration in AI has spurred significant development[6]. More specifically, it deals with problems for heavy interaction based learning, universal access to global classrooms, *'lifelong'* and *'life-wide'* learning[6]

Software AI Systems built for Collaborative Learning have been termed *Computer-Supported Collaborative Learning*(**CSCL**)[4] systems. However, researchers have noted that the answer still is incomplete, for example, students using CSCL need the following to properly operate in these virtual environments,

1. Guidance

2. Support Online

3. Practice

4. A more detailed emphasis on social interaction

The latest trend yet has been about catering to students' communicative competencies and collaborative achievements[6]. AI agents are being formed as models instead to represent students' misconceptions, goals, plans, preferences, beliefs, students' meta-cognitive, emotional and teamwork skills

4   Pacing Future Education with Technology

The emphasis has now shifted to the 21st century, as the 21st century requires *"different skills"*[6]. As a result, researchers have shifted to prioritizing,

1. Acquiring new knowledge quickly

2. Explore alternative problem solving approaches regularly

3. Form new learning communicative effectively

4. Tackling knowledge challenges and opportunities

5. Rapid revision of what is taught

6. Taking advantage of evolving education

Clearly, the new dimensions do not specify age groups or specify categories. All it defines are criteria on basis of which post-modernist educational systems should be based. The element of personalized learning[6] is clearly visible, and the growth of development varies from individual to individual.

To keep the system, AI systems need to work on ideas of "adapting to new changes is improved and expanded learner competencies"[6]. Key aspects of this include,

1. Critical thinking

2. Creativity

3. Collaboration

4. Meta-cognition

5. Motivation

It is thus safe to say that skilled workers have *more job opportunities* than less skilled workers[1]. Helping students to *"remain comfortable with uncertainty"* and to *"cultivate deep amateur involvement in science"*

5   Requirements In Technological Environment

As the extant AI systems are further studied, worked upon, and refined, the aspect of a learner's stages of progression — relating to the AI-based pedagogical approach — becomes more prominent. The key assessment that needs to be ascertained — as these pedagogical tools gradually become embedded into the way students, and instructors, produce and process information — is the feasibility of placing the student(s) ahead after they pass the requirements and tests of a traditional grade or level.

As mentioned in Section 2.2, Automated Tutors in a collaborative learning environment have seen students abusing or ignoring the system. Furthermore, as students interact with the AI environment, the students' input to the AI is from a socio-cultural perspective, which the AI tutor has no input of. [4]

This means that the metrics and the merits, that the AI system will induce for the appropriate progression of a learner to the next level of their educational progression, are also potentially indifferent to these socio-cultural aspects.

6   Humanities And AI Education

Currently, many computer programs and tools are being used extensively in the in the art industry. Many extant software programs being used, like Adobe's suite of services or Grammarly for Writers, are starting to incorporate AI ranging from basic to highly sophisticated to help automate basic repetitive tasks. This can be utilized to help speed up the process of using their tools and reduce the need for time-consuming manual processes. Machine learning tools are being deployed to help automate video processing, and other features that can be distilled into one-click maneuvers.

AI can also compliment the creative process of an artist. Usually, AI systems deal with infinite possible solutions and permutations of different problems. This means that AI can be used to produce a vast number of possible options and ideas to choose from during the said process. [3]

7   Conclusion

The vast expansion of AI-based pedagogical methodology in the field of education has generated positive indicators regarding the enhancement of the tutor-learner interaction as well as the learning process of students, particularly in STEM-related courses and career paths.

While the research and innovation in this area has been significant, there are significant challenges with on-

line learning, education with mentors and teachers, and interaction-based and collaborative learning, that need to be addressed in more detail before these system can be deployed and embedded in the existing educational framework.

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