

ARTIFICIAL INTELLIGENCE NATURAL LANGUAGE PROCESSING: A BARRIER TO KNOWLEDGE ACQUISITION IN HIGHER EDUCATION

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ABSTRACT

Higher education students are recognized for neglecting assigned readings hence, researchers explored artificial intelligence (AI) as an instrument of motivation; in the process of satisfying this demand, another interference developed, English, a linguistic barrier. Multi-cultural disparities impede literacy, equally, AI natural language processing (NLP) and prompts require fluency and command of English, which can be a hindrance for the underprivileged. The research aimed to determine the potential of AI educational tools in facilitating learning. Empirically, exploratory design was espoused to uncover the reasons behind college students' lack of interest in reading and identify factors that can motivate them. A total of 162 first-year college students participated in the study. AI was specifically selected as a motivational instrument. Findings show students expressed optimism regarding the integration of AI into education, high-achieving students displayed confidence when interacting with AI, while those with lower proficiency faced difficulties due to NLP obstacles.

KEYWORDS

Artificial intelligence, assigned reading, Higher education, language barrier, NLP

1. INTRODUCTION

Education is a major progressive element that drives diverse societal developments; therefore, its impacts are continually assessed. For predetermined purposes, evaluations of students are focused on and not limited to their participation, creativity, discipline, competency, etcetera. Thus, evaluating the quantity of knowledge gained over time is the most important assignment for the educator. Similarly, in assessing educators, students grade them based on knowledge of the subject matter, delivery approach, student-educator interactive connectedness, impartiality, and empathy with firmness. With these measuring standards, the education landscape is constantly evolving, as the performance of educators and students is defined and based on multiple factors [1]. Given these deviations, pedagogical models and instructions are modified to accelerate productive outcomes. Such demands on education attracted the innovative invention of AI educational tools to augment conventional pedagogical instances; changing pedagogical structures and educational resources for equitable and holistic education. Equitable access to education, exposure to enhanced computational systems, and the internet are basic universal human rights and no longer symbols of status. According to Holmes and Tuomi [2], since the paleolithic age, one of the biggest inventions receiving hot policy debates is AI, it is a

fundamental cutting-edge educational tool that prepares students to be dynamic, smart, and ready for the current modern life. Judiciously acknowledging principles that guarantee human rights, equality, inclusion, ethics, and credibility, Borisov and Stoyanova [3] affirmed the usefulness of AI applications in education. AI transforms learner experiences, gives immediate feedback, and ubiquitous access to advanced resources by knowledgeably processing information for productive outcomes.

2. RELATED WORK

A compiled data of the past, existing, and future knowledge that gives credit to profound collective writings within a contextual framework that considers information from dissertations, academic papers, articles, research, academic sources, and identifies inconsistencies, presents a thorough argumentative analysis in a related work. It may be published in journals on a singular subject or unpublished but is put together by a literatus.

2.1. Global Acumens of Artificial Intelligence

The fourth industrial revolution AI, has emerged from fiction to reality, it used to work behind the scenes of obscure science laboratories and audiovisual presentations, delivering mail into inboxes, suggesting friends on social media, electronic gaming consoles, money transactions, and disbursements through automated machines. But recently, its activities have gone beyond these and welcomed into homes, offices, and institutions to drive the global economy agenda. AI has become more powerfully disruptive, and with it as an enabler, machines are outsmarting and outperforming earthlings in numerous ways beyond imagination. Its speed and depth have technologically transformed the socio-economic development of many advanced countries with positive and negative implications [4,5]. According to Crompton and Burke, the world is not new to artificial intelligence, the term was invented when Turing described the existence of intelligent machines in 1937 and 1950. This awe-inspiring madness was followed up by McCarthy in 1956 hence its definition, advancements, and capabilities have grown bringing change [6]. Schiller International University [4] and many scholars define AI as computer systems, and complex algorithmic mathematical models that can perform complicated tasks that normally require human intelligence to process large data, extract patterns, and improve systems/tasks. These enable the machines to learn, transform, and improve over time to affect creations and invaluable boost industries universally. Currently, as a game-changer, its activities go beyond these, it is inevitably hyped and accepted into normalcy. These computing systems can engage like humans, they learn, adapt, and self-correct. This has raised interdisciplinary interest from diverse scholars across the orb in many fields, from neuroscience, psychology, linguistics, architecture, business, engineering, health, education, et cetera. All these industrial bodies connect to AI's perceptible knowledge in their respective fields thereby challenging the definition of AI but limited to enhanced computer systems within specific disciplines. This article focuses on AI in education. Al-Zahrani and Alasmari stated that technologies factored into AI technologies include but are not limited to, voice recognition, NLP, machine learning, and decision making, intelligent tutoring systems, chatbots, adaptive learning platforms, automated grading systems, data analysis tools [7]. AI can generate digital outputs in text, videos, images, music, and research codes [8]. The appropriate use of AI can unlock community knowledge in new ways to enhance life and transform anything. In all fields, AI is not to replace humanity but to complement and enhance human activities.

2.2. Artificial Intelligence Impact on Education

Erenew, AI outshines any technological advancement, as modernity unfolds there is much to be explored; its emergence has allured the world into many discourses. The potential of AI application in education and the role of education in developing literacy has increased, the increasing interest is easy to comprehend as innovation, learning, and knowledge creation are acclaimed as the basis for the post-industrial economy. Though controversially vague, transformative AI is automating educator tasks, and is effective in augmenting human cognition in learning. As a focus of commercial interest, it is recommended that administrators and educators have clear views about AI's potential in education and adopt these ground-breaking technologies into practice. Historically, Gardner's theory and similar cognitive philosophies have a connection with AI. Indefinitely, these models subtly control AI systems in education, its building structures are influenced by these cognitive theories to effectively inform and educate equitably. The central focus of learning is to develop problem-solving capacities that rest on the availability of efficient knowledge structures in the human mind [2]. AI has the leading position and propensity to highly enrich and enhance the teaching-learning experience, as it presents more interactive opportunities for educators and learners. It goes far beyond conventional approaches to teaching and learning. Its intended purpose is not to replace man but to complement and enhance the task force as it has unlimited access to advanced up-to-date educational resources around the clock. Chatbots and virtual assistants are learning companions ready to assimilate, respond, provide, and support learners with precise data on any topic, offering real-time guidance on updated knowledge. With adaptive learning, AI prepares students through personal learning environments and tools that meet learner trajectories, tailored content, learning habits, and competence. On collaborative platforms, AI fosters effective knowledge exchange among learners. Similarly, AI offers objective, thorough, and comprehensive rapid responsive feedback; it identifies errors and suggests improvements that accelerate learning. All these are positive additions that creatively prepare and elevate learner confidence.

2.3. Implications of Artificial Intelligence in Education

Though AI accelerates sustainable development goal 4 (innovative teaching and learning practices) to meet the 2030 education agenda, this rapid technological development inevitably brings multiple risks and challenges. According to UNESCO, the education sector in many countries is largely unprepared for the pedagogical and ethical integration of these rapidly evolving digital tools [8]. Ación et al. and Schiller International University [4,9] opined that, with all these AI igniting exciting opportunities AI offers education, some statements and questions still matter, AI cannot be superior over humanity for iron and clay can never mix and even if they do its longevity is questioned. People do not have to feel belittled by the advent of AI because Earth cannot survive without humans. The presence of AI requires educators to professionally develop, train, and reskill. AI is a revolting tool in revolting times to offer real-time, information, and research, and enhance automating routines; giving ample time for educators to listen, emotionally support, guide, nurture, and foster creativity and divergent critical thinking among learners. According to Audrey Azoulay of UNESCO [8], like all digital tools, AI under the umbrella of technology can be a tremendous opportunity for human development, it can also cause prejudice and harm, worsening digital divide issues compounding on inclusiveness. She continued to state that the primary interest of learners, cannot be integrated into education without the necessary safeguards and regulations from governing bodies. In a global survey conducted by UNESCO, due to the absence of national policies, over 450 schools and universities indicated less than 10% had institutional policies and guidance concerning AI applications. Gabriela Ramos, an assistant director-general of Social and Human Sciences, UNESCO added that though AI has its unique mandate and affords many benefits that are currently shaping everyday life and the technological world; without ethical systems in place, it

exacerbates differential treatments that threaten human rights and independence [10,11]. Aside from UNESCO's recommendations, many institutions have likewise recommended and established principles to guard the holistic use of AI in education. At the 18th United Nations Internet Governance Forum in October 2023, diverse scholars and educators gathered in Kyoto Japan. According to Elon University, they established six holistic principles as a framework for action regarding the use of AI. First is to put humanity at the center of work not technology, second is to promote digital inclusion within and beyond institutions. Thirdly, digital literacy should be an essential core of education, preparing learners to be proficient safely and ethically. As a multidisciplinary tool, learners must understand the basic concepts of computer systems, machine learning, algorithms, data science, and programming. Fourth, conventional approaches should augment AI tools to empower and improve learning-teaching and emphasize human adaptability to these technologies besides continuous reskilling. Thus, learning with technologies should be lifelong and pragmatic as AI evolves. Lastly, AI research and development must be done responsibly considering ethical standards, failsafe systems, and global administrative accountability [12]. As the world evolves technologically, deprived countries are advised to catch up to meet the standards for sustainable living. Hlophe and Dlamini [5] of Eswatini concur that the education system in most deprived countries needs amendment to match up with the rest of the technologically fast-developed world. In a multicultural world, linguistic diversity remains a barrier to education, in many countries [8], the local lingo is a main barrier, however, AI NLP requires fluency in English, which is a major hindrance for many deprived citizens. Instead of limiting AI to human connections through social media, there is a need for soft skills acquisition and mindset-altering programs to change the mindset of citizens to holistic tacit productiveness. The need to have command over English is quintessential as NLP for most AI is English. AI interrupts many conventional approaches to things because of its inevitable appetite to learn, the more it interacts with humans the more it learns to become efficient. An enabler to think constantly about situations to enhance outcomes that challenge intellect while ensuring less energy and effort. It's been observed that higher education students often fail to read their assigned course materials, therefore, researchers specifically adopted open-book and AI as motivational instruments to stimulate knowledge acquisition. Based on these profound deductions, the research aims to determine how AI educational tools can support learning in higher education.

3. EMPIRICAL METHOD

The exploratory research approach was suitable for the study since it systematically investigates and clearly defines existing problems to be better understood. Saha and Swedberg [13,14] correspondingly stated that exploratory research is often referential to grounded theory or interpretative research, it shares insightful perspectives pertinent to gathering preliminary data, identifies salient concepts, and formulates hypotheses for further comprehension. Swedberg further stated that exploratory research is an important toolkit for the social scientist. It relies on qualitative data but sometimes quantitative, its instrumentation for data gathering can be interactively unstructured and considers interviews, observations, and open-ended questions to probe and achieve exploratory goals. To an extent, exploratory research lays the foundation that uncovers differential approaches for more detailed future research. By observation and the lack of students' class participation, it was concluded that students did not like reading course materials. The open-book assessment was to determine how much students have gained. According to Campbel et al., purposive sampling identifies cases that use limited resources effectively and are most likely to yield appropriate and useful information [15]. Open-book is a way of gathering holistic varied assessment data points, an enabler to help students find information. The test questions were heterogeneously set to develop critical thinking skills. In a paperless era, mobile devices are convenient digital storage for storing students' educational resources. To broaden the scope of learning and educational resources AI was another convenient tool sought for queries.

The study population involved 162 first-year college students in 5 heterogeneous demographic groupings that range from 32 to 35 in each (cohort A- 33; cohort B – 35; cohort C - 34; cohort D and E – 30 respectively). Data was garnered by academic achievement tests, observations, unstructured interviews, and focus groups, which allowed more in-depth analysis of the student's experience with the AI.

4. RESULTS AND ANALYSIS

A simple fact remains, ubiquitously, educators cannot be available to their learners always to expand concepts; nevertheless, with the increasing prevalence of AI educational tools, this possibility can be achieved. To garner data, student academic achievement test time was used, allowing a more in-depth analysis of students' experiences with AI, the study involved 5 heterogeneous groups of first-year college students. In recent years, the use of AI as a multidisciplinary tool with concomitant proliferation has attracted great interest in higher education because of its affordances to faculty and students. AI rapidly ascended in all industries in 2020 due to the COVID-19 pandemic and continues to manage many institutions post-COVID times. AI in education modifies instruction to meet differential learning needs, develops assessments, provides specific prompts, and predicts academic successes [6].

4.1. AI and Open-Book Rationale

In the outburst of digital tools in educational technology, Jedishkem et al. stated that about 90 percent of college students extensively use mobile technologies [16] with AI assistants as interactive communication tools. Annku's research has shown the value of mobile device adoption in education and the consistent increase in wireless data within the walls of tertiary institutions. This makes it an easy target to fall on [17]. Additionally, it was observed that most students were on their phones during in-person lecture sessions, aside from responding to social media buzzes, some were on the pretense of chatting but rather interacting with AI and gathering data on the taught course. Why the pretense? Most advanced and proficient learners do not want to be tagged as 'smart' and others would rather query AI under the pretense of not following content. According to UNICEF [18], in many underdeveloped countries like Eswatini, there is poor relevance for school curricula to labor markets, hence students are not motivated to study. Additionally, they lack the support for school-to-employment transition, keeping many young people away from empowered livelihoods and better futures. Students underestimate the importance of education let alone reading, resulting in a disregard for textbooks and academic papers as sources of information for knowledge and better livelihood, affecting concentration and participation in class. Such misconceptions only hurt the students, and perpetuate unemployment, socio-economic and demographic divide issues. The utmost aim of AI tools in education is to lead learning in precise knowledge areas. Usually, students learning gain is measured in percentage improvement in pre-test and post-test experiments, given the pre-study level of knowledge. Logically, assessment is a measure to indicate the success of a learning gain after the expected curricular objectives are established. This is perhaps why it is a focus of the most well-known AI educational adaptive systems [2]. Nonetheless, AI was adopted as a motivational tool for open-book assessment because of its rapid response system, it relies on natural language reasoning, understanding, and generation as a way of handling human language interpretation from multiple perspectives with limitations. Therefore, in changing patterns and improving the approach to motivate and engage students to study and comprehend academic reading, AI chatbots were introduced in an open-book readiness assessment as an incentive to prepare them for closed-book end-of-semester examinations since technology has affected student concentration, reading, and engaging patterns. According to Edutopia, open-book assessment shifts the focus from committing to memory words without understanding and meaning to critical

thinking and application, this offers a more realistic reflection of real-world problem-solving [19]. The test questions were heterogeneous to make students think before answering; they were rephrased and not directly as in the course materials given. Senkova et al. conventionally identified two categories of tests, recognition-based and recall-based, with multiple-choice questions representing the latter and essay and short-answer questions representing the former. Senkova et al. added that assessments can be done with closed-book (students attempt to retrieve information from memory) or open-book setups (allows students to retrieve data from related works) [20]. The cognitive process of recalling stored data into consciousness ameliorates learning and can facilitate future retrieval. Additionally, some scholars conclude that open-book assessment is considered less effective than closed-book assessment in building knowledge. According to Zeivots and Barak's research, high alarming rates of college students neither like to read nor study even though assigned reading materials are pivotal in knowledge enrichment and prepare them for effective discourses concerning particular topics [21,22]. According to Northern Illinois University [23], many students avoid reading, some of the reasons range from tediousness to lack of time, boredom, family and constant life demands, overload of course work and managing deadlines, social activities, not knowing exactly what or how to read, lack of understanding complex or new vocabulary, not seeing the connection between required reading and lecture material. Another disturbing finding highlights linguistic diversity as the "why" students do not like reading [8]. Most students have limited knowledge of technical terms resulting in unpreparedness, hindering understanding and usage. Language as a barrier affects the reading confidence of the learner, when they open the books all they see is gibberish and some are lost on what to query on search engines. Barak rightly stated text is in to stay for the next decades, and not going anywhere. In an era of surged information that is constantly growing, the new reality is that those who refuse to read and learn lag behind. Although literacy impedes learning, it is an indispensable component that bridges the skill gap for a successful academic journey to a working destination. In 2022, the World Economic Forum estimated over 50% of employees required re-skilling to meet current industrial demands or face compulsory retirements.

4.2. Assessment Outcomes

Per the Imperial College of London's [24] deductions, understanding the assessment criteria in the early year of higher education is important to excel, any mark over 50 percentile (50-70%) under the traditional grading system is a decent grade. A mark higher than that means students are beginning to understand, and getting a mark over the 60 percentile is excellent because students have developed a deep knowledge of the subject. They further stated that though it rarely happens, it is unlikely for tertiary students' marks to range from 90-100%. Planning before answering any question is a sensible option, marks are given to display a level of comprehension and mastery, but the best marks go to proficient students who have read wide around a subject, reasoned and deduced critical analyses. Low marks are given to pieces of work that have irrelevant details. Figure 1 below illustrates the evaluation scale, a 5-scale range of competency; there is the advanced, proficient, average, basic, and below basic. The advanced (4%) are those who might have been conversant with course material therefore knowing where to identify answers with deduced critical analysis. Also, they are likely to have command over effective interaction and communication with AI. Twenty-six percent were proficient, 41% were averagely equipped, 20% had basic knowledge and skill and 9% had irrelevant details and therefore below the basic mark; they are likely to be "the deprived" due to digital divide issues or having challenges to comprehend content or interact with AI primarily because of NLP obstacles. Those in the basic and below basic range (29%) might have had difficulty retrieving information. The likelihood of remembering depends on intrinsic and extrinsic factors and the strength of storage ability and retrieval strength [20]. Analyzing Figure 1 below from an overall average standpoint, based on the traditional grading system, a little more than 70% of students' assessment outcomes

were favorable, indicating an optimistic turnout. Akinwalere and Ivanov [25], highlight AI as a tool to add value to the quality of learning by increasing access and retention.

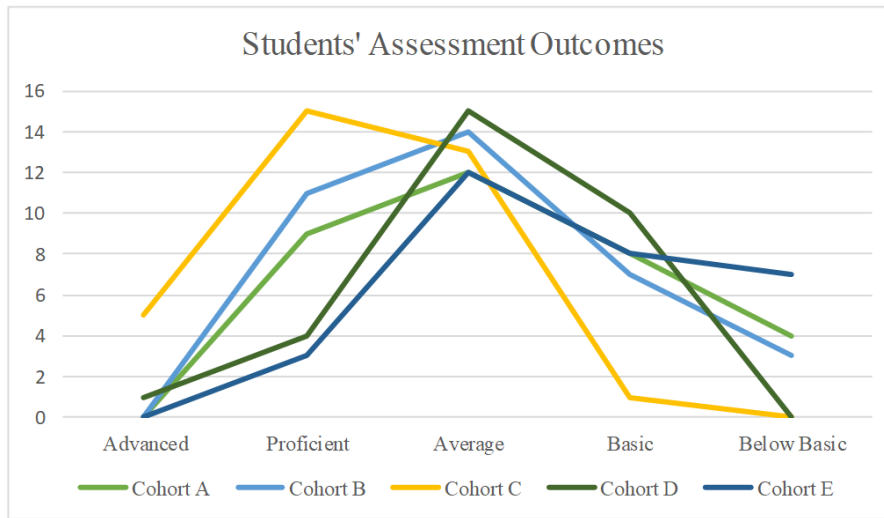


Figure 1. AI influence on learners' productivity

Considerably, Cohort B is head and shoulder above all the cohorts and more efficient in reading assigned course materials; they also did not interact with AI and had limited open-book time. Cohort C had the highest advanced marks, and Cohort E had the highest below basic mark, followed by A. Cohort C had more proficient interactions, followed by A and D. However, cohorts C and D had none in the below basic range.

4.3. Learner Experiences and Challenges

The presence of AI, controlled independent study with absolute silence as they interacted to fish out solutions to questions. All students had an optimistic response to the approach of having AI in the conventional setting while technologically navigating to find answers with ease and confidence affirming Borisov and Stoyanova's conclusion that students want AI in education [3]. In higher education, technology is explored to create a personal learning experience for productive outcomes [26]. At first, some students were unconvinced since most lecturers did not accommodate such technological affordances and advised the exposure to stay within the moment. According to Holmes and Tuomi [2], for some educators, the current educational space still mirrors the setting of a hundred years ago. Though flaws are identified, the one-size-fits-all ideology remains knowing learners have different paths for learning, it is an expensive truth and cannot be scaled to deprived countries with a reasonable learner-educator ratio in mind. AI can fix these flaws, transforming education as it has significantly taken over education and educational resources. It can reduce basic costs so that many citizens can have equal education, liberating content and top educators from the confines of elite institutions, and helping all to be aware of their potential in the age of AI. Symbiotic to flexible education models that can be accessible to all, improving education standards.

Soriano identified discrepancies in AI tools, their level of enlightenment is not the same, traditional chatbots had constraints and proposed rules for responding within their knowledge base but the current conversational AI chatbots are designed to be objective and relevantly respond naturally. They rely on a combination of NLP to make sense of the diverse questions and commands the user inputs [26]. Students interacted with varied chatbots, on average, students had

at least two or more chatbots to assist in their studies. Some noted ones were Pi, WhatsApp assistant, Chat GPT, Personal AI, Ask AI, Nova, AI Chat, AI grammar et cetera. The maximum identified was 7 AI assistants on one phone and such students had remarkable outputs. Nonetheless, ISO annual Meeting reports concur with students' deductions, identifying AI's limitation gaps, and AI's inability to answer multiple questions, some students believe it restricts the scope of learning as it does not give definite answers. AI has limited contextual understanding and memory; words have many meanings hence lexical ambiguity is expected [27].

Natural language processing is gradually taking over most modern digital technologies effectively. It is an amalgamation of linguistics and computer science that enables computerized systems to understand and respond to natural language conversations, through text or voice recognitions. English remains the widely spoken language internationally, to avoid sidelining, they all acknowledged the need to have command over English, as NLP for most AI is English-driven. They were made to understand that if AI has an inevitable appetite to upgrade, enabling it to think constantly around situations to enhance outcomes that challenge the intellect so, humans have to reskill and professionally develop to bridge gaps. This also suggests universal models that can transfer learning into other languages to reach a multi-cultural audience. Due to digital divide issues, some did not have access hence they had to share with others to prevent copying. The advent of AI in education requires educators to be current in modifying content, they must learn not to stop professionally developing and learn to be creative in instructional delivery and creating assessments that demand critical thinking. Besides, the increasing trends of the growing amount of information challenges educators to evaluate qualitative data competently. Natural language processing provides a means to diagnose problems and recommend simplified and accelerated discovery of what lies within the data as observed by Zhai et al. [28].

5. CONCLUSIONS

Participants acknowledged the immeasurable value of AI in enriching the pedagogical experience, improving resource accessibility, and fostering innovation within the walls of higher education institutions. Their enthusiasm extended particularly to AI educational service tools, like chatbots. Aligning AI goals with educational objectives, exposure, and experience, and effectively addressing associated challenges were identified as crucial determinants in shaping students' perspectives. For lifelong learning, students are advised not to seek prime information from AI. Students must hone their communication skills by taking proactive responsible approaches to master their reading and probing skills as they correlate with overall academic success. To encourage reading, students have to learn to accept the assistance AI offers in reading, learn to pronounce words correctly, learn how to use graphic organizers manually and digitally to recapitulate content, create reading response journals, and form reading study groups to model best practices for a successful learning experience. Integrating AI into higher education can produce a profound ripple effect, not only will students have access to educational materials, but prospectively have round-the-clock assistance in their studies. Educators can advise students to consult AI for support due to the high enrollment levels, conserving time and energy. For more productive outcomes, all stakeholders in higher education must unlock AI's potential benefits by possessing fundamental AI literacy to interact effectively with conversational AI. Ethics, regulations, and principles such as the following must be in place, prioritize humans as the central core of work not technology, to promote digital inclusion within and beyond education. Learning about technologies must be an experiential lifelong learning process because AI evolves. As a multidisciplinary tool, students must understand basic computer systems and machine learning. Digital literacy should be an indispensable education core, preparing learners to be proficient. AI is supposed to augment conventional teaching-learning approaches, therefore, the need for human adaptability and skill development is a continuous demand.

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