Enhancing Social Engagement among Online Learners' Using AI-Driven Tools: National Open University of Nigeria Leaners' Perspective

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Abstract: *The need for online education has increased significantly. People now prefer to work to fulfill the necessities of life and pursue education to advance their skills because of the rising difficulty. This quest increases the demand for distance education thereby raising questions about how distance learning institutions can effectively assist their learners. Employment of Artificial Intelligence (AI) tools will not only provide solutions but also improve and render effective service and support to learners. AI-driven tools such as personalized or adaptive learning and chatbots for learner support have significantly helped to improve efficiency in virtual environments. This research aims to investigate how National Open University of Nigeria (NOUN) students view the contribution of AI tools in enhancing social interaction in their virtual learning environment. The study seeks to determine the requirements, inclinations, and challenges related to social interaction in the online learning space and explore how AI-powered solutions might effectively address these challenges to create a more dynamic and engaging learning environment. A survey was conducted to ascertain the level of awareness among the learners on the use of these tools, the challenges related to social interaction in online space and explore the ways AI-powered tools can effectively address issues in the learning environment to create a more dynamic and engaging learning environment. This study has identified that a greater number of learners in NOUN have little or no knowledge of the availability of these tools as well as how they can effectively use it. The level of awareness of the learners on the use of these tools is low. The study found 27.5% awareness and usage of AI tools provided by the institution. Several platforms were identified by respondents; however, ChatGPT was the most widely used AI platform. The study also discusses the importance of AI tools in enhancing collaboration and social engagement among learners. It identifies the challenges in integrating AI in Education and provides possible solutions to the challenges.*

Keywords: Online Learning, Social Engagement, Personalized Learning, AI-driven Tools

1. INTRODUCTION

The quest for online education has increased significantly and is becoming more and more common in the quickly changing educational landscape because it provides flexibility and accessibility to students all over the world [1]. Due to increased hardship, people prefer to work to meet life demands as well as acquire education to improve their skills. This quest makes the demand for distance education increase thereby posing issues on how to provide effective support to learners by distance learners' institutions. Fostering social connection among students is one of the difficulties that online learning platforms has [2]. It can be challenging to reproduce the typical classroom atmosphere in a virtual setting because of the inherent chances for connection and collaboration. Employment of AI tools will not only provide solutions but also improve and render effective service and support to learners. AI has made learning to be more effective. It assists distance learners in helping them achieve their learning objectives. AI-driven tools such as personalized or adaptive learning, Chatbot for learner support has significantly help to improve the efficiency in virtual environment [3].

Fortunately, intriguing options to improve social engagement among online learners are presented by breakthroughs in artificial intelligence [4]. Artificial intelligence (AI)-powered solutions provide novel approaches to promoting communication, teamwork, and community development in online learning settings. Through the utilization of AI technology, educational establishments such as NOUN can produce lively and captivating virtual learning environments that encourage learners to actively participate and develop a feeling of community [5]. AI-driven solutions use cutting-edge algorithms and data analytics to support student collaboration, communication, and individualized learning. Teachers can design dynamic, interactive virtual classrooms that replicate the social dynamics of traditional face-to-face settings by utilizing artificial intelligence (AI). These technologies provide a variety of features, such as social networking platforms

for peer-to-peer engagement, virtual tutoring systems for individualized help, and intelligent chatbots for immediate support. Additionally, integrating AI-driven technologies is a viable strategy for tackling the social aspect of online learning, allowing teachers to design inclusive and stimulating learning environments that encourage student participation, communication, and community building [6]. Even when AI provides the ease of communication and foster support to learners, there is still needed to create awareness and engage learners to achieve the objectives of the technology integration [3]. Universities that use AI tools improves its efficiency in providing adequate support to the learners [6].

The aim of this research is to investigate how National Open University of Nigeria (NOUN) students view the contribution of AI-tools in enhancing social interaction in their virtual learning environment. The study seeks to determine the requirements, inclinations, and challenges related to social interaction in online learning space and explore the ways in which AI-powered solutions might effectively address these aspects to create a more dynamic and engaging learning environment at NOUN.

1.1 Brief Overview of NOUN

Established in 1983 as a distance learning institution, the National Open University of Nigeria (NOUN) gained official recognition as a university only in 2002. It was established to offer high-quality, flexible education to a wide range of students, including working adults, students returning to school after a break from the workforce, and those unable to attend conventional brick-and-mortar institutions for various reasons. As an online learning institution, NOUN has completely changed the face of education by providing students worldwide with access to education never before possible [7]. With the utilization of print materials, online resources, and multimedia content, its flexible approach to education enables students to learn at their own pace, regardless of location. Due to its emphasis on equality and accessibility, the university is a well-liked option for students looking for higher education possibilities in Nigeria and abroad. As a result of NOUN's dedication to innovation and technologically improved learning, the school is advancing education in Nigeria by adapting to the changing demands of its varied student body, one of which is the need for online social interaction in the classroom.

1.2 Learner's Online Social Engagement and its Importance

Social engagement, often used interchangeably with terms like interaction, involvement, or even collaboration, refers to one's integration into academic and social systems. It can occur in any social setting, such as clubs, dormitories, student unions, etc., and is linked to increased levels of satisfaction, confidence, and a sense of belonging when learning activities are engaged [8]. It is an essential part of the educational process because it promotes a feeling of belonging, teamwork, and shared learning goals. Recent research has demonstrated the critical impact that social engagement plays in student interaction and academic success [9]. These exchanges are crucial for students and teachers to be socially present [7]. Below are some key essentials of social engagement.

1. **Provide enhanced learning outcomes:** Collaboration and interaction with peers and instructors facilitate a more profound understanding of course material. Students can gain diverse perspectives and insights through discussions, group projects, and peer feedback, leading to enhanced learning outcomes [4].
2. **Foster motivation and accountability:** Social engagement fosters a sense of accountability as students feel responsible for themselves, their peers, and instructors. Communicating with classmates and partaking in group activities can increase motivation and encourage students to stay on track with their studies [10][11].
3. **Reduced isolation:** Online learning can sometimes be isolating, especially for students accustomed to traditional classroom environments. Social engagement provides opportunities for connection and companionship, reducing feelings of separation and enhancing the overall learning experience [12].
4. **Skill development:** Collaborative activities in online education help learners develop important skills such as communication, teamwork, and problem-solving [13]. These skills are highly valued in academic and professional contexts and essential for success in today's interconnected world.
5. **Building community:** Social engagement fosters a sense of belonging and community among learners. By interacting with classmates, students can form meaningful relationships, establish support networks, and create a sense of friendship that enriches their educational journey [11].
6. **Feedback and support:** Peer-to-peer interaction allows students to provide feedback, share resources, and support each other's learning process. Additionally, engaging with instructors and peers enables students to search for clarification, ask questions, and receive timely assistance when needed [14].

Creating inclusive, vibrant, and productive online learning environments requires social involvement. Educators may improve student outcomes and equip students to succeed academically and professionally by encouraging teamwork, communication, and community development. Students naturally connect with teachers and peers in traditional brick-and-mortar venues, fostering a thriving educational ecology. However, the challenge lies in replicating this communal atmosphere in the virtual realm [12]. Although there is no denying the advantages of online learning, there are still worries about the possibility of social isolation among students enrolled in virtual programs [13].

This study, which focuses on students at the National Open University of Nigeria, recognizes the significance of addressing this issue and investigates the integration of Artificial Intelligence (AI) as a catalyst for enhancing social

engagement among online learners [1][15]. Recent years have seen tremendous advancements of AI in education, providing creative answers to long-standing problems. Educational institutions looking to close the virtual divide may find that using AI to enhance the social aspects of online learning is a viable option [15][16][13]. Previous research indicates that asynchronous learning via social media and interactive apps can improve synchronous instruction and encourage student participation [17][18]. However, if learners are to adjust to the demands of change in this digital age, they need to adapt to the use of AI-driven tools on their online sociability platforms [13].

2.0 AI-DRIVEN TOOLS IN THE CONTEXT OF SOCIAL ENGAGEMENT AND ONLINE EDUCATION

In the 21st century, new technologies like Artificial Intelligence (AI) can be very useful in enhancing your presence on social media. AI provides a variety of tools that make it simpler to engage with your audience creatively and effectively [19]. These tools are intended to assist with various aspects of social media management, including content creation, result analysis, and overall engagement improvement.

By exploring and utilizing some of the best AI-powered social media tools, institutions can greatly enhance their social media strategies and ensure seamless interactions among the actors of open and distance learning education. Each tool offers unique features that can make your content more attractive and engaging for your audience. By leveraging these tools, you can also stay up to date with the latest trends and ensure that your social media content stands out.

The AI-enabled social media tools that can be used for open and distance learning education [20] include but not limited to the following: Lumen5 which uses machine learning algorithms to automatically create engaging video content by analyzing text-based content and generating videos with images, music, and animations [21]. Next is Canva which is an excellent design tool that uses AI to suggest layouts and designs based on user preferences. This helps speed up the image and video creation process [22]. Brand24 is another interesting tool that uses AI to track conversations and mentions on social media platforms and provides sentiment analysis and influencer identification features [23]. Sprout Social provides in-depth analytics and insights on social media performance [24]. This platform also offers automated publishing and audience targeting features. Finally, Optimize AI uses machine learning to personalize content and messaging for specific audiences, offering A/B testing [25].

2.1 AI-driven Tools in Online Education

AI-driven tools in the context of online education are technologies and applications that use artificial intelligence (AI) to enhance and optimize various aspects of the online learning experiences. These tools use machine learning algorithms, natural language processing, and other AI techniques to automate tasks, provide personalized learning experiences, and improve overall efficiency in the educational process. The research of [26] discovered that contents tailoring drives process better than a one-size-fits-all design. The key components and functionalities of AI-driven tools in online education are:

1. **Personalized learning:** AI-powered tools analyze individual student data, learning styles, and preferences to deliver customized learning experiences. This personalization helps adapt the content, pace, and difficulty level of lessons to meet the needs of each learner, for example Google's Optimize AI and Lumen5 provide features for personalized learning experiences.
2. **Adaptive learning systems** AI algorithms are used in adaptive learning platforms to continuously evaluate student performance and modify content or learning paths accordingly. This ensures that learners receive customized support and challenges based on their progress [4].
3. **Intelligent tutoring systems:** Intelligent tutoring systems powered by AI offer real-time guidance, explanations, and feedback based on learners' interactions and performance [27]
4. **Automated grading and assessment:** AI is used to automate the grading of assignments, quizzes, and assessments, saving time for educators and providing instant feedback to students. TeachFlow is a good example of an AI automated grading and assessment platform [28].
5. **Chatbots for support:** AI-powered chatbots assist students by answering queries related to course content, deadlines, and administrative matters. Learners are provided immediate responses and guided through common issues [29].
6. **Predictive analytics:** AI tools utilize predictive analytics to recognize patterns in student behavior and performance, allowing educators to intervene early and provide additional support to students who may be at risk of falling behind [30]
7. **Natural language processing (NLP):** NLP is used to process human language. In online education, NLP is applied for features such as speech recognition, language translation, and sentiment analysis in discussion forums. OpenAI's ChatGPT is a well-known example.
8. **Smart content recommendations:** AI algorithms analyze user behavior, preferences, and past interactions to recommend relevant learning materials, resources, or additional courses. This helps learners discover content that aligns with their interests and goals The Brand24 platform has features that support smart content recommendations.
9. **Virtual assistants:** AI-powered virtual assistants can provide support beyond Q&A, offering guidance on study strategies, time management, resources, and administrative tasks, as well as course navigation.
10. **Learning analytics platforms:** AI-powered learning analytics tools collect and analyze data on student performance, engagement, and interactions in online learning environments. Educators use insights to improve instructional design and student outcomes [31].

11. **Emotion recognition:** Emotion recognition technologies can be used in some AI tools to tailor feedback and enhance the learning environment based on learners' emotional state.

AI-powered tools used in online education are designed to create learning environments that are more responsive, efficient, and personalized. As technology advances, these tools play a critical role in transforming traditional education models and providing learners with effective and customized learning experiences.

2.2 AI-driven Tools Used for Enhancing Social Engagement in Online Learning Environments

Artificial Intelligence (AI) is being adopted by several industries, including education. With advancements in technology, AI tools have become valuable resources for students who want to improve their learning experiences. Companies such as Open AI have played a significant role in making this possible.

These AI tools for students not only enhance the learning experience but also provide valuable insights and personalized support. Let's explore some of the most popular types of AI tools for students, so you can find the best AI tools for your needs. Given below is the list of some major AI-powered education tools that can assist students and education service providers to efficiently deliver their services.

1. **AI-based learning management systems (LMS):** AI-based Learning Management Systems have transformed how students interact with course materials and assessments [32]. These systems utilize advanced AI algorithms to analyze student performance data and provide actionable insights. With the help of machine learning algorithms, LMS recommends personalized resources, highlights areas where students need practice, and tracks progress over time to enable a customized learning experience.

2. **AI-powered tutoring tools for students**: Virtual tutors powered by AI have become increasingly popular among students [13]. These AI-powered tutoring tools act as personalized mentors, offering tailored lessons, explanations, and feedback. It can analyze student responses and progress to identify areas where they need additional support. This approach ensures that students receive targeted assistance, regardless of their learning pace or style.

3. **AI tools for language learning:** Learning a new language can be challenging, but AI tools have made it more accessible and engaging. AI technologies are now being used to develop interactive language learning experiences. These tools can:
   i. Simulate real-life conversations
   ii. Analyze pronunciation
   iii. Adapt lessons based on individual progress.

These tools can help students enhance their language skills through immersive and dynamic practice, improving fluency and confidence. It also has many other innovative applications in education such as AI chatbots that provide instant support and answers to common student queries, reducing response times and improving accessibility [32].

Additionally, AI algorithms can analyze vast amounts of educational data to identify patterns and trends, helping educators make data-driven decisions to enhance teaching strategies [33].

With the continuous evolution of technology, AI tools have limitless potential to assist students in their learning journeys while empowering educators to create more personalized and effective learning environments. So, when choosing AI tools for learning, it's important to consider several factors. It's not enough to select a tool that appears impressive at first glance. Instead, it's crucial to find a tool that can effectively address the specific needs of your school or institution. One of the first things to consider is the compatibility of the AI tool with your existing systems. It's essential to ensure that the tool can seamlessly integrate with your school or institution's infrastructure. By choosing a tool that is compatible with your existing systems, you can avoid unnecessary headaches and ensure a seamless transition. This compatibility facilitates a smooth implementation and usage of the AI tool, saving you time and effort in the long run.

Secondly, when it comes to AI tools, effectiveness and reliability are essential. Before making a decision, it's important to conduct thorough research and read user reviews to evaluate the tool's track record and reputation. Tools with a proven history of delivering positive learning outcomes with accurate assessment and personalized feedback are always better to reckon with.

Moreover, while AI tools offer several benefits, it is also very important to understand their shortcomings. They are not substitutes for human interaction or critical thinking. They should be seen as a complement to traditional teaching methods rather than a replacement. This is because, while AI tools can provide personalized feedback and assessment, they cannot replace the guidance and expertise of a teacher. So, encouraging students to engage in critical thinking and fostering meaningful classroom discussions remain essential components of a comprehensive education system.

2.3 Current State of Social Engagement in Online Learning at NOUN

Before now, the social engagement of the National Open University of Nigeria (NOUN) was characterized by a mix of online and in-person interactions. Presently, the National Open University of Nigeria has embraced online learning as the primary mode of education. The university has implemented a range of digital platforms and tools to facilitate online learning and social engagement among students and faculty members.

These social platforms include the use of virtual classrooms, video conferencing, discussion forums and social media platforms to enhance collaboration and interactions. The university has also adopted its teaching methods to promote

student engagement and ensure that learning continues inclusively and effectively. It also introduces discussion forum and focus group to enhance learners' interactivity during leaning. One of the focus of this study is to ascertain the level at which the learners of this online institution are aware of the availability of the aforementioned tools. Another objective of this study is to investigate the availability and engagement with AI interfaces from within NOUN virtual platforms. Even though there are individual examples of AI use in NOUN activities such as email composition, this study found no fully integrated AI platform such as a custom trained LLM virtual assistant that is available throughout all NOUN online educational tools.

3.0 METHODOLOGY

Quantitative data collection method was used in this study. An online structured questionnaire developed using Google Forms was adopted to ascertain the level of awareness of the use of AI tools by the learners of National Open University of Nigeria, their level of competence in the use of these tools and the challenges they encounter as they use the available AI driven tools. The questionnaire was distributed to students who were contacted by e-mail. The electronic questionnaire was used because of the diverse location of the learners. The learners are in different parts of the country. A population of 500 undergraduate students was approached, however only 262 valid responses were received. The SPSS software (Version 28.0.1) was used in the analysis and descriptive statistics using the frequency and bar chart, were employed to be able to achieve the objective of the research.

4.0 DISCUSSION AND RESULT

Figure 1 and Table 1 below shows the level of awareness and usage of the AI tools provided by the institution. Out of 262 learners who responded to the questionnaire, only 72(27.5%) are aware of the available tools. Lack of awareness of these tools makes it difficult for students to use them. When the learners are aware of these tools and are trained properly on the use, it increases the chances of them making use of it. For example, the discussion forum tool on their LMS is not utilized properly by the learners due to lack of awareness of the availability as we see in the figure below. The table shows the number of ''No'' and ''Yes''' responses in the Frequency column. The frequency of each response is indicated as a percentage of the total responses received in the Percent column.

Table 1: Level of awareness of the use of AI tools by the learners

		Frequency	Percent	Cumulative Percent
Valid	No	190	72.5	72.5
	Yes	72	27.5	100.0
	Total	262	100.0	

Have you used AI-driven tools designed to enhance social engagement in your online learning experience at NOUN?
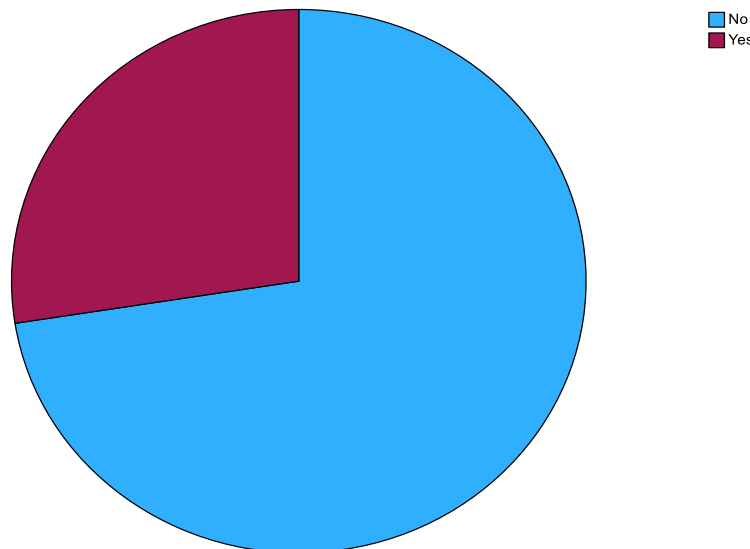

Figure 1: Level of awareness of the available tools

Figure 2 also shows that the learners are unaware of what AI tools are. What they answered in this category proves that they need training on what AI tools are and how it can help them to improve and enhance their interactivity among their fellow students. By this, the isolation that is associated with online learning will be resolved. ChatGPT is a writing tool rather than social engagement tools. The only thing ChatGPT does it to help to enhance learners writing ability.
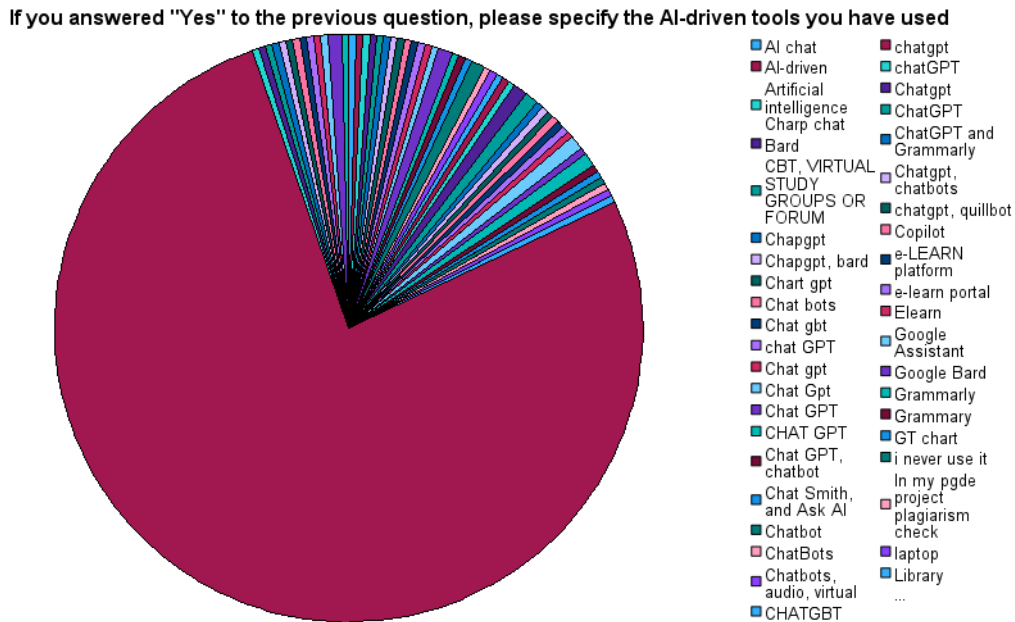
Figure 2: AI driven tools identified by the learners

4.1 Overview of the Current Challenges Faced in Fostering Social Engagement among Online Learners

Fostering social engagement among online learners presents various challenges, even as technology continues to advance [11]. Here is an overview of some of the current challenges faced in this context:

Online learning can be challenging when it comes to maintaining motivation and engagement, especially during the COVID-19 pandemic. According to a study [34][8], learners struggle to stay motivated and engaged in their courses due to the disruption of their normal routines and increased stress levels. One of the reasons is that online learning demands more self-regulation, autonomy, and positive learning dispositions from fellow students.

Online learners often experience feelings of isolation and disconnection from their instructors and peers due to the limited opportunities for face-to-face interaction and feedback [35]. Additionally, technical issues, lack of information and communication technology (ICT) resources, or poor physical work environments can hinder online communication [36]. This can further exacerbate the challenges faced by learners in online education.

Research has shown that individuals who take courses online may experience lower-quality of learning outcomes than those who attend in-person classes [37]. This is due to differences in course design, teaching methods, evaluation, and support. Additionally, Online learners frequently leverage social media and other online tools to enhance their learning experience and social connections [14]. However, they may also encounter some challenges, including distractions, privacy concerns, cyber-bullying, or misinformation. So, to effectively navigate the online environment, online learners must develop digital literacy and media literacy skills.

Moreover, addressing these challenges requires a combination of pedagogical strategies, technological solutions, and a commitment to creating a positive and inclusive online learning environment. Continuous feedback from learners and ongoing improvement of online learning practices are essential to overcoming these challenges.

4.2 Importance of addressing social isolation and fostering a sense of community among remote learners

It is crucial to address social isolation and foster a sense of community among remote learners, as this impacts both their overall well-being and the effectiveness of the learning experience. Here are some important reasons why we should address social isolation in remote learning:

1. **Belonging and connectedness:** Having a connection with peers and instructors is crucial for student success. When learners feel a sense of belonging, they are more likely to persist, graduate, and excel academically. This is especially true for students from historically underrepresented backgrounds. The COVID-19 pandemic has caused a significant shift towards remote, distance, and blended learning, leading to the disruption of traditional in-person interactions [10]. Consequently, students have missed out on on-campus events, face-to-face classes, and social gatherings, resulting in a feeling of disconnection from their institutions and peers.

2. **Practices to foster community virtually:** Virtual interactions can be facilitated through platforms such as Zoom and Google Meet. Additionally, students should be provided with opportunities to chat freely, just like they would during lunchtime in a school cafeteria.

3. **Discussion boards:** Encourage students to post profiles and pictures on discussion boards. Establish small base groups that regularly check in with each other throughout the semester.

4. **Collaborative learning:** Implement collaborative learning groups to develop a sense of community. This can enhance connectedness and organizational commitment, ultimately reducing student turnover and dropout rates.

5. **Holistic support:** Institutions should prioritize addressing students' holistic needs, including financial, academic, and social-emotional aspects, by centering the student perspective to create a comprehensive strategy that promotes a strong sense of belonging.

Creating a sense of community among remote learners not only enhances their academic experience but also contributes to their overall well-being and success [10].

4.3 The Future of AI-based Online Education

Additionally, AI can facilitate custom and adaptive learning experiences in a remote setting. With a thorough analysis of learner data and preferences, AI algorithms can recommend tailored contents, track progress, and provide customized feedback - including recommending the best AI tools for students based on their needs. Also, fully integrated AI tools such as an LLM that is accessible throughout all NOUN online learning platforms, can provide individualized user support and tailored assistance. These capabilities will ensure that learners receive personalized attention and support in their study, regardless of their physical location. Conclusively, AI tools could become an invaluable resource for students seeking to enhance their learning experiences. Through tailored learning experiences, improved accessibility, enhanced engagement, and motivation, AI tools for students could offer numerous benefits to learners.

5.0 CONCLUSION

In conclusion, the National Open University of Nigeria (NOUN) seeks to be s a trailblazer in the realm of online education, leveraging cutting-edge technologies to enrich the learning journey of its diverse student populace. Through strategic integration of artificial intelligence (AI) tools, NOUN can address some the challenges inherent in fostering social engagement among online learners. By effectively harnessing AI-driven solutions such as Large Language Models trained on NOUN large dataset of documents and teaching materials, and by adopting personalized learning systems, and intelligent tutoring platforms, NOUN will create a dynamic virtual learning environment where students can actively collaborate, receive tailored support, and cultivate a sense of community.

Despite the hurdles associated with online learning, such as social isolation and limited awareness about available tools, NOUN has demonstrated a steadfast commitment to overcoming these obstacles through proactive measures. By raising awareness among students, providing comprehensive training, and continuously refining the accessibility and usability of AI tools, NOUN has empowered its learners to fully capitalize on the benefits of online education. This proactive approach underscores NOUN's dedication to fostering an inclusive and supportive learning ecosystem that nurtures student success in a digital age.

Looking ahead, a symbiotic relationship between NOUN's virtual learning environment and AI-driven tools holds tremendous promise for the future of open and distance education. As technology continues to evolve and AI capabilities expand, NOUN remains at the forefront of innovation, poised to further enhance the educational experience for its students. By embracing the transformative potential of AI, NOUN will not only be shaping the future of education in Nigeria, but also pioneering new frontiers in online learning worldwide, ensuring that all learners have equal opportunities to thrive in an increasingly interconnected and technology-driven world.

REFERENCES

[1] Ali, W. (2020). Online and remote learning in higher education institutes: A necessity in light of COVID-19 pandemic. *Higher Education Studies*, *10*(3), 16–25.

[2] Bello, L. K. (2021). Exploring the Capabilities of Online Facilitation to bridge the Instructional Gaps in Open and Distance Learning Delivery in Nigeria. *Journal of Education and Practice*, *12*(3), 174–184.

[3] Alam, A., Mohanty, A. (2023). Facial Analytics or Virtual Avatars: Competencies and Design Considerations for Student-Teacher Interaction in AI-Powered Online Education for Effective Classroom Engagement. In: Tomar, R.S., *et al.* Communication, Networks and Computing. CNC 2022. Communications in Computer and Information Science, (1894). Springer, Cham. https://doi.org/10.1007/978-3-031-43145-6_21

[4] Aggarwal, D. (2023). Integration of innovative technological developments and AI with education for an adaptive learning pedagogy. *China Petroleum Processing and Petrochemical Technology*, *23*(2), 709-714.

[5] Raffaghelli, J. E., Foschi, L. C., Crudele, F., Doria, B., Grion, V., & Cecchinato, G. (2023). The ENCORE Approach. Pedagogy of an AI-driven system to integrate OER in Higher Education & VET. In *ENCORE project results*. https://hdl.handle.net/11577/3502320

[6] George, B., & Wooden, O. (2023). Managing the Strategic Transformation of Higher Education through Artificial Intelligence. In *Administrative Sciences* 13(9). https://doi.org/10.3390/admsci13090196

[7] Kopus, T. L., Mikhalat, E. S., Belozerova, E. Y., & Meshcheryakova, O. V. (2021). Instructor presence in online teaching: challenges and opportunities. *SHS Web of Conferences*, *127*(3002).

[8] Ezeanya, C. U., Onyeji, E. M. & Ejimofor, I. A. (2023), Enhanced Student Retention in Open and Distance Education through Effective Academic Performance Model using Naive Bayes and K-Nearest Neighbour Machine Learning Algorithm. Journal of Applied Sciences, Information and Computing. 4(2), https://doi.org/10.59568/JASIC-2023-4-2-04

[9] Kaufmann, R., & Vallade, J. I. (2022). Maximizing the student experience: moving forward with online learning. *Communication Education*, *71*(2), 152–154.

[10] Becker, T. B., Fenton, J. I., Nikolai, M., Comstock, S. S., Swada, J. G., Weatherspoon, L. J., & Tucker, R. M. (2022). The impact of COVID-19 on student learning during the transition from remote to in-person learning: using mind mapping to identify and address faculty concerns. *Advances in Physiology Education*, *46*(4), 742–751.

[11] Gillett-Swan, J. (2017). The challenges of online learning: Supporting and engaging the isolated learner. *Journal of Learning Design*, *10*(1), 20–30.

[12] Clark, C. E. J., & Post, G. (2021). Preparation and synchronous participation improve student performance in a blended learning experience. *Australasian Journal of Educational Technology*, *37*(3), 187–199.

[13] Srinivasa, K. G., Kurni, M., & Saritha, K. (2022). Harnessing the Power of AI to Education. In *Learning, Teaching, and Assessment Methods for Contemporary Learners: Pedagogy for the Digital Generation*. 311–342. Springer.

[14] Brown, C., Czerniewicz, L., & Noakes, T. (2019). Online content creation: Looking at students' social media practices through a connected learning lens. In *Social Media and Education*. 140-159. Routledge.

[15] Amelia, R., & Istianah, T. N. (2021). Teaching strategies: How do teachers in remote area survive during remote learning? *ELT Forum: Journal of English Language Teaching*, *10*(2), 146–153.

[16] Khosravi, H., Shum, S. B., Chen, G., Conati, C., Tsai, Y.-S., Kay, J., Knight, S., Martinez-Maldonado, R., Sadiq, S., & Gašević, D. (2022). Explainable artificial intelligence in education. *Computers and Education: Artificial Intelligence*, *3*, 100074.

[17] Fabriz, S., Mendzheritskaya, J., & Stehle, S. (2021). Impact of synchronous and asynchronous settings of online teaching and learning in higher education on students' learning experience during COVID-19. *Frontiers in Psychology*, *12*, 4544.

[18] Khan, R. A., Atta, K., Sajjad, M., & Jawaid, M. (2022). Twelve tips to enhance student engagement in synchronous online teaching and learning. *Medical Teacher*, *44*(6), 601–606.

[19] Kessler, G. (2018). Technology and the future of language teaching. *Foreign Language Annals*, *51*(1), 205–218.

[20] Sundaresan, S., & Zhang, Z. (2022). AI-enabled knowledge sharing and learning: redesigning roles and processes. *International Journal of Organizational Analysis*, *30*(4), 983–999.

[21] Lumen5. (2024). Lumen5 - Video Maker: Create Videos Online in Minutes. https://lumen5.com

[22] Gehred, A. P. (2020). Canva. *Journal of the Medical Library Association*, 108(2). https://doi.org/10.5195/jmla.2020.940

[23] Brand24. (2024). Brand24 - Monitor Social Media. https://brand24.com

[24] SproutSocial. (2024). Sprout Social: Social Media Management Solutions. https://sproutsocial.com

[25] Google LLC. (2024). Optimization AI: Solve large scale optimization problems to create AI-infused enterprise decision support systems. https://cloud.google.com/optimization

[26] Ogbaga, I. N., Nweke, H. F., & Ndunagu, J. N. (2023). Deploying persuasive technology-based model in the prevention and control of malaria in Nigeria to reduce incidence of deaths. *African Scientific Reports*, (2)3, 130.

[27] Guo, L., Wang, D., Gu, F. (2021). Evolution and trends in intelligent tutoring systems research: a multidisciplinary and scientometric view. Asia Pacific Educ. Rev. 22, 441–461. https://doi.org/10.1007/s12564-021-09697-7

[28] TeachFlow AI (2024). Revolutionizing Assessment: AI's Automated Grading & Feedback – Unlocking Efficiency, Objectivity, and Personalized Learning. Available at: https://teachflow.ai/revolutionizing-assessment-ais-automated-grading-feedback-unlocking-efficiency-objectivity-and-personalized-learning/

[29] Baha, T.A., Hajji, M.E., Es-saady, Y., & Fadili, H. (2023). The impact of educational chatbot on student learning experience. *Educ. Inf. Technol., 29*, 10153-10176. https://doi.org/10.1007/s10639-023-12166-w

[30] Hoti, A., Zenuni, X., Hamiti, M., & Ajdari, J. (2023). Student Performance Prediction Using AI and ML: State of the Art. *2023 12th Mediterranean Conference on Embedded Computing (MECO)*, 1-6. https://doi.org/10.1109/MECO58584.2023.10154933

[31] Dickler Rachael (2012). SoLAR Society for Learning Analytics Research. https://www.solaresearch.org/2021/11/learning-with-and-from-artificial-intelligence-driven-analytics/

[32] Rerhaye, L., Altun, D., Krauss, C., & Müller, C. (2021). Evaluation methods for an AI-supported learning management system: ok and qualifying added values for teaching and learning. *International Conference on Human-Computer Interaction*, 394–411.

[33] Teng, Y., Zhang, J., & Sun, T. (2023). Data-driven decision-making model based on artificial intelligence in higher education system of colleges and universities. *Expert Systems*, *40*(4), e12820.

[34] James, T., Toth, G., Tomlins, M., Kumar, B., & Bond, K. (2021). Digital disruption in the COVID-19 Era: The impact on learning and students' ability to cope with study in an unknown world. *Student Success*, *12*(3), 84–95.

[35] Thacker, I., Seyranian, V., Madva, A., Duong, N. T., & Beardsley, P. (2022). Social connectedness in physical isolation: Online teaching practices that support under-represented undergraduate students' feelings of belonging and engagement in STEM. *Education Sciences*, *12*(2), 61

[36] Ferri, F., Grifoni, P., & Guzzo, T. (2020). Online learning and emergency remote teaching: Opportunities and challenges in emergency situations. *Societies*, *10*(4), 86.

[37] Baum, S., & McPherson, M. (2019). The human factor: The promise & limits of online education. *Daedalus*, *148*(4), 235–254.