FIFTH

ANNUAL INTERNATIONAL CONFERENCE

2025

THE ROLE OF

EMERGING TECHNOLOGIES

IN HIGHER EDUCATION

MAY 8-10, 2025

CONFERENCE PROCEEDINGS

NORTH AMERICAN UNIVERSITY

The Role of Emerging Technologies in Higher Education

Conference Proceedings of
North American University's 5th Annual International Conference (AIC)

May 8-10, 2025

Editors
Shweta Shroff
Faruk Taban

North American University
11929 W Airport Blvd, Stafford, Texas 77477
info@na.edu | www.na.edu
2025

Publisher

North American University (NAU)
11929 W Airport Blvd, Stafford, Texas 77477
Phone: 832 230 5555 | Email: info@na.edu | URL: www.na.edu

Conference website: www.na.edu/internationalconference/
Conference email: conference@na.edu

CONTENTS

North American University: Where the World Comes Together

Founded in 2010, North American University (NAU) is one of the newest universities located in Stafford, Texas, near the diverse metropolitan city of Houston, which is full of opportunities. NAU is an international institution of higher learning committed to providing a nurturing environment for the systematic pursuit of academic excellence, professional and personal development, responsible citizenship, and global cultural competency. NAU is a private, non-profit, accredited, full-service college offering baccalaureate degree programs in four disciplines with several concentrations: Interdisciplinary Studies in Education, Computer Science, Business Administration, and Criminal Justice. NAU also offers six master's degree programs: M.Ed. in educational leadership, an M.Ed. in Curriculum and Instruction, M.Ed. in School Counseling (2), an MBA, and an M.S. in Computer Science. NAU offers a student-centered learning environment where every student is valued and provided with opportunities to grow. NAU has an international staff and student body, representing over 60 countries. It currently has collaboration agreements with several universities globally.

FORWARD

Dear Participants and Contributors,

Welcome to North American University's 5th Annual International Conference in Houston, Texas.

This year's theme, "The Role of Emerging Technologies in Higher Education," highlights the evolving role of education globally. Over the three days, scholars, educators, researchers, and policymakers will have an opportunity to exchange ideas, share best practices, and foster collaboration to advance higher education.

The program features keynote presentations, panel discussions, research papers, and workshops covering diverse topics. We are honored to have distinguished experts as keynote speakers, offering valuable insights into global education challenges and opportunities. Additionally, the conference provides ample networking opportunities to build connections and collaborations.

We thank our Organizing Committee, sponsors, and partners for their dedication. Your participation and engagement are vital to the success of this event.

We look forward to seeing you at the 5th NAU Annual International Conference in Houston.

Sincerely,

Dr. Faruk Taban
President
North American University

OPENING REMARKS

Dear Guest,

It is a great pleasure to welcome you to the 5th International Conference hosted by North American University. Your presence means a lot to us, and we thank you for being here.

Since 2021, this conference has brought together colleagues from around the world to explore key themes in higher education. From *online learning* to *internationalization* and *sustainability,* each year we've tackled timely and important topics.

This year, we focus on **"The Role of Emerging Technologies in Higher Education."** As tools like AI, data analytics, and virtual platforms continue to evolve, we believe it is vital to understand how they can enhance learning, increase access, and support student success.

This gathering is more than just presentations. It's a chance to share ideas, build connections, and find practical solutions. We hope everyone leaves with insights that can be applied at their own institutions. We're also pleased to invite you to our **Commencement Ceremony on May 10**, celebrating the achievements of our graduating students. Right after, we'll offer an optional visit to **NASA's Johnson Space Center**—a perfect way to close our conference on a note of innovation and inspiration.

Each year, we're encouraged by the growing number of participants. It shows our shared dedication to collaboration, progress, and meaningful education.

Once again, welcome. We look forward to the ideas, conversations, and partnerships that will grow from this event.

Warm regards,

Prof. Dr. Serif Ali Tekalan
VP for International Affairs
North American University

Impact of Emerging Technologies on Students' Attitudes to Learning in Higher Education: A Case Study of the Federal University Oye-Ekiti, Nigeria

Philip Idowu Ajewole, philip.ajewole@fuoye.edu.ng
Amos Olusola Ogunjobi, olusola.ogunjobi@fuoye.edu.ng
Oyegbami Gabriel Aderibigbe, gabriel.oyegbami@fuoye.edu.ng
Olubunmi Kayode Ayanwoye, olubunmi.ayanwoye@fuoye.edu.ng
Sina Fakoyede, sina.fakoyede@fuoye.edu.ng
Taiwo Togunloju, taiwo.togunloju@fuoye.edu.ng
Oluwakemi Mogelola Anyanwu, oluwakemi.anyanwu@fuoye.edu.ng
Adieme Franca Ginikachi, franca.adieme@fuoye.edu.ng

Federal University Oye-Ekiti, Nigeria

Abstract

Attainment of the aims, objectives and goals of higher education in the 21st century absolutely require adopting the use of emerging technologies to enhance excellence and healthy competitions. However, studies reveal conflicting ideas on the consequences of the use of technologies on students' attitudes to learning in higher institutions. This study, therefore, examines the impact of emerging technologies on students' attitudes to learning in higher education with a case study of the Federal University Oye-Ekiti, Nigeria. Technology Acceptance Model (TAM) anchors the study and relevant pieces of literature are reviewed to explain the variables of the study. Descriptive survey design was adopted for the study, using validated instrument tagged 'Emerging Technologies and Students' Attitudes to Learning Questionnaire (E_TS_ALQ, r=0.89)' was used to gather data. Descriptive and inferential statistics of simple frequency counts, and percentages were used to answer the research questions and t-test and ANOVA to test the hypotheses generated at 0.05 level of significance. The study reveals that the emerging technologies such as Artificial Intelligence, Big Data, Extended Reality and Learning Analytics enhance students' attitudes to learning. However, the challenges of irregular power supply, poor network, inadequate training, inadequate facilities and non-availability of scholarship opportunities to buy necessary research equipment constitute hindrances to full exploration of the emerging technologies in Nigerian higher institutions. The study concludes that the emerging technologies have both positive and negative impacts on students' attitudes to learning. Thus, it is recommended that while the students embark on self-development, the management should take calculative efforts to address the challenges hindering the full exploration of the emerging technologies in Nigerian higher institutions.

Keywords: Impact, emerging technologies, students, attitudes to learning, higher education

Impact of Emerging Technologies on Students' Attitudes to Learning in Higher Education: A Case Study of the Federal University Oye-Ekiti, Nigeria

Background to the Study

Education in the 21st century has migrated from analogue to digital by incorporating advanced technologies into teaching, learning and research activities. The emerging technologies constitute the scientific innovations that have brought unbeatable transformation to teaching, learning, research, administration, security, data analysis and transactional activities in higher education. In the 21st century, there can be little or no tremendous success outcomes without incorporating the emerging technologies. No educational institution can grow and compete favourably in the 21st without adopting to the emerging technologies usage. Kreie et al (2017 and Saykılı (2018) concurred that technology is instrumental to students' academic success.

Technological advancement plays a significant role in teaching-learning and research activities in the 21st century. The emerging technologies have permanently changed students' attitudes to learning in higher education. Gone were those when teaching, learning, research, assignment and project writing could hardly be possible without compulsorily waiting until teachers arrived, borrowing textbooks or going to the libraries. The challenges that surrounded learning in the previous centuries constituted to high dropout rates, high repetition rates and the reasons why many people could not go to schools. Conversely, the emerging technologies have made educational activities very easy in the 21st century. For instance, learning, teaching and research can successfully take place in the bedroom without necessarily going to classes or physically meeting the instructors. The internet in conjunction with various social platforms such as zoom, Telegram, WhatApp, ChatGBT and Artificial Intelligence have immensely made virtual learning or distance learning a possibility.

Thus, the roles of the emerging technologies in the 21 century cannot be overemphasised. The emerging technologies such as Artificial Intelligence (AI), blockchain, Big Data (BD), Internet of Things (IoT), Extended Reality (XR) and Learning Analytics (LA) applications are the current trends that have made tremendous impacts on research and teaching-learning activities in the higher education in the 21st century. Scholars such as Aktaruzzaman and Plunkett (2016), Leontyeva (2018), Alharthi (2020) have identified the negative impacts of the emerging technologies to education as ……. However, the positive impacts of the technologies have made the accrued challenges insignificance as noted by Leontyeva (2018).

The roles of emerging technologies in higher education

Education is a bridge to cross from ignorance to knowledge and a ladder to progress and a master key that activates potentials. Higher education is the post-secondary education which comprises of the undergraduate and postgraduate programmes. It usually takes place in universities, polytechnics, colleges and other degree or higher certificate awarding institutions. Before a person can be termed educated, he must have passed through a higher education, passed the prescribed coursed and been awarded a degree. Higher education helps to develop people's intelligent quotient and prepare them to be trained as professional employees or employers of labour so as to be useful to themselves and the society as a whole. Higher education is the catalyst to develop the nation and people's full potentials. For example, Advanced countries like the United States of America, Great Britain, Germany, and Australian, among others, are able to attain rapid economic, technological and military growth and

development as a result of having the larger percentages of their population passing through the process of higher education.

In spite of the advantages of the emerging technologies, the challenges that have been associated with them include inadequate funding to procure and install adequate relevant facilities, irregular power supply, cybercrime, cyber threats like loss of data caused by viruses (Saykılı, 2018), Yilmaz (2019), Alharthi (2020) & Majdi, 2023). Students are interested in online learning, but there are concerns about the quality of interaction with teachers and the university's underdeveloped technological infrastructure (Leontyeva, 2018).

History of higher education (and its impact on) in advanced countries

Higher education promotes higher studies in the areas of teaching, research and community development. According to Wikipedia (2025), the oldest universities in the world include the University of Al-Karaouine (Morocco, 859 AD), University of Bologna (Italy, 1088 AD), University of Oxford (UK, 1096 AD), University of Cambridge, University of Salamanca (Spain, 1218 AD), University of Padua (Italy, 1222 AD), University of Naples Federico II (Italy, 1224 AD), University of Toulouse (France, 1229 AD), University of Siena (Italy, 1240 AD), University of Coimbra (Portugal, 1290 AD), University of St. Andrews (Scotland, 1413 AD), University of Glasgow (Scotland, 1451 AD), University of Basel (Switzerland, 1460 AD), University of Uppsala (Sweden, 1477 AD) and University of Copenhagen (Denmark, 1479 AD).

Theoretical framework - Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) is adopted to guide this study.
TAM is a popular model in the social sciences that examines how new e-technology or e-services are embraced and used. It is predicated on the idea that users' attitudes and intentions to utilize a technology are influenced by their perceptions of its utility and usability. In order to forecast technology's behaviour and offer a theoretical justification for its successful deployment, TAM's main goal was to illuminate the mechanisms behind technology adoption and educate practitioners on potential actions they may take before putting systems in place.

Relevance of TAM to the current study

TAM is relevant to the current studies in the following ways

1. When adopted and properly utilised, TAM can have both short-term and long-term positive effects on an educational institution, teachers and learners.
2. TAM can aid students' curiosity to learning, research and proffering solutions to the societal problems.
3. On the long run, the proper use of the emerging technologies can help the employees trained in higher institutions to increase productivity in any organisation they are employed after graduation because virtually all organisations in the 21st century have embraced technology as necessary tools.
4. The use of technology saves time, the cost of production and aids effectiveness as well as prompt delivery of services in schools and organisations.
5. The adoption and application of TAM makes teaching, learning, research and educational activities seamless not only to students, but teachers.

Literature review

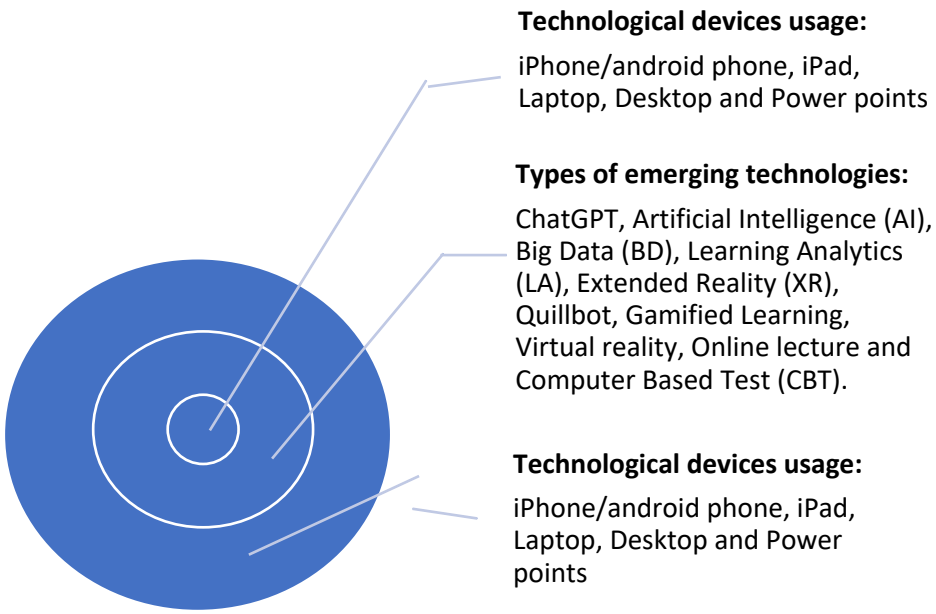
Relevant literature to the study are reviewed to guide the study. According to Haddad et al. (2014), educational technology is seen as a basic component of education and becomes an effective tool during lessons. They give the students the opportunities to be interacting with one another and receive direct feedback from fellow students (Kreie et al, 2017). Alharthi (2020) opined that meeting the demands of education has been greatly made possible by the technology revolution. Emerging technologies enhance the learning and professional capacity of the users, enhance workforce skills, meeting personal needs and promoting continuous learning (Beese, 2014 & Aktaruzzaman & Plunkett, 2016); used to fast rack learning and effective interaction between students and teachers (Majdi, 2023). Technology is instrumental in distance education (Kreie et al, 2017 & Saykılı, 2018).

Technology enhances the delivering of educational materials by the teachers to a large audience of students in different location at a time (Smith, 2011; Demirer & Sahin, 2013; Dinc, 2017 & Yilmaz, 2019). Sahin and Shelley (2008) and Bradley and Bradley (2015) concurred that technology is commonly used in classrooms. Majdi (2023) observed that technologies improve learners and teachers classroom experiences.

Purpose and significance of the study

This paper examined the impact of emerging technologies on students' attitudes to learning in higher education with a case study of the Federal University Oye-Ekiti, Nigeria. The study is significant in the sense that it gives university students concrete information about the emerging technologies to enhance their knowledge. Also, the paper is a springboard to guide all the stakeholders in education to properly harness the privileges brought in by the emerging technologies.

Figure 1
Emerging technologies, usage of social networking platforms and technological devices usage



Source: Researcher-designed (2025)

Through observations and interview conducted among a randomly selected number of students in FUOYE, Table 1 reveals the emerging technologies, usage of social networking platforms and technological devices usage explained below:

1. The technological devices which the students are commonly fond of using include iPhone/android phone, iPad, Laptop, Desktop and Power points. These technological devices serve several purposes. They are used for typing, communication, data transfer, writing of test or examination, presentations of term papers, assignments and research findings. Also, technological devices are used by students and Lecturers as mobile library, notebook and document reservoir. They serve as the tools or platforms used by the students to explore the emerging technologies and social networking platforms. Obviously, the emerging technologies and the social networking platforms can only be made used when there are relevant technological devices. Relevant studies conducted by Smith (2011), Demirer and Sahin (2013), Dinc (2017) and Yilmaz (2019) established that technological devices are essential tools for learners in the 21st century.
2. The types of emerging technologies commonly used by student in FUOYE include ChatGPT, Artificial Intelligence (AI), Big Data (BD), Learning Analytics (LA), Extended Reality (XR), Quillbot, Gamified Learning, Virtual reality, Online lecture and Computer Based Test (CBT). The students make use of these technologies to carry out their learning activities such as assignments, findings, lectures, test, data anaylysis and plagiarism checker as the case may be. This is in line with the studies of Saykılı (2018), Yilmaz (2019) and Alharthi (2020).
3. The frequently used social networking platforms are: YouTube, Twitter, Facebook, Telegram, WhatsApp and Online simulation games. These social networking platforms are used by the students for academic and social related interactions. For example, the students claimed to belong to different platforms to exchange ideas, collective problem-solving and gainfully interactions.

These innovative emerging technologies, usage of social networking platforms and technological devices usage immensely enhance students' knowledge acquisition and technologically enabled skills that are relevant to their studies, manpower development as well as productivity in the 21st century. Technologically inclined students have the better chance to perform better academically that their mates because teaching-learning process is becoming more digitalised as against the analogue.

Opportunities and challenges of emerging technologies

In the modernised world, emerging technologies helpfully and rapidly transform education in terms of teaching-learning process, research and community services into a digitalised entity, with the aid of collaborative tools that incorporate virtual reality, Internet of Things, online learning platforms, interactive whiteboard, AI and e-books. All these are the collaborative tools that make the teaching-learning process, research, data analysis and findings seamless through personalised and digitalised knowledge sharing in academia. Also, emerging technologies enhances flexible teaching, learning, research and problem-solving schedules without much ado of distance barrier. The accessibility of teachers by learners and vice versa vis-à-vis immense number of opportunities to access relevant educational resources constitutes another contribution of the emerging technologies. In addition, the emerging technologies save time, provide cost effectiveness, promote critical thinking, convenient to use, develop digital literacy skills, personalised learning and research opportunities.

However, the emerging technologies have ushered in some challenges such as plagiarism, falsification of data, internet fraud and cybercrime or attacks using various forms of digitalised tools like ChatGBT and AI. In spite of these challenges, the opportunities of the emerging technologies far outweigh the palpable challenges (Majdi, 2023).

Summary and conclusion

This paper examined the impact of emerging technologies on students' attitudes to learning in higher education with a case study of the Federal University Oye-Ekiti, Nigeria. Relevant number of literature were reviewed. Technology Acceptance Model (TAM) was adopted to guide the study. In spite of the advantages of the emerging technologies, the challenges that have been associated with them include inadequate funding to procure and install adequate relevant facilities, irregular power supply, cybercrime, cyber threats like loss of data caused by viruses. The study reveals that the emerging technologies such as Artificial Intelligence, Big Data, Extended Reality and Learning Analytics enhance students' attitudes to learning. However, the challenges of irregular power supply, poor network, inadequate training, inadequate facilities and non-availability of scholarship opportunities to buy necessary research equipment constitute hindrances to full exploration of the emerging technologies in Nigerian higher institutions. The study concludes that the emerging technologies have both positive and negative impacts on students' attitudes to learning. Thus, it is recommended that while the students embark on self-development, the management should take calculative efforts to address the challenges hindering the full exploration of the emerging technologies in Nigerian higher institutions.

The way forward

In view of the foregoing observations, the following suggestions are made to make the emerging technologies have a positive impacts on students' attitudes to learning in higher education:

1. Internet facility should be provided to be readily available 24/7 in the University to enable the students enjoy the benefits which other students in advanced countries enjoy.
2. The emerging technologies constitute a tool to fast track knowledge and not the knowledge themselves.
3. The technological devices which the students are commonly fond of using include iPhone/android phone, iPad, Laptop, Desktop and Power points. Thus, the school management should sort for funds or grants to ensure individual students have these devices or get them with subsidized cost.
4. The social networking platforms such as YouTube, Twitter, Facebook, Telegram, WhatsApp and Online simulation games should not be substituted for class activities.

Contribution to knowledge

The findings of this study will enhance both teachers and learners in higher institutions of learning to have a deeper understanding of the emerging technologies and their applications. Also, it will guide the management of educational institutions to prepare necessary measures to address the accrued challenges that are associated with the emerging technologies. It will contribute to the body of knowledge in education.

References

Alharthi, M. (2020). Students' attitudes toward the use of technology in online courses. International Journal of Technology in Education (IJTE), 3(1), 14-23.

Aktaruzzaman, M. & Plunkett, M. (2016). An innovative approach toward a comprehensive distance education framework for a developing country. American Journal of Distance Education, 30(4), 211-224.

Beese, J. (2014). Expanding learning opportunities for high school students with distance learning. American Journal of Distance Education, 28(4), 292-306.

Demirer, V. & Sahin, I. (2013). Effect of blended learning environment on transfer of learning: An experimental study. Journal of Computer Assisted Learning, 29(6), 518-529.

Dinc, E. (2017). Web-based education and accessibility. International Journal of Technology in Education and Science (IJTES), 1(1), 29-35.

Fedynich, L. Bradley, K.S. & Bradley, J. (2015). Graduate Students' perceptions of online learning. Research in Higher Education Journal, 27(1).

Haddad, M. E. O., Ferreira, N. S. C. & Faria, A. A. (2014). The Use of Educational Technologies in Distance Education—Enabling the Appropriation of Teaching and Learning Process. Open Journal of Social Sciences, 2, 54-58.

Kreie, J., Johnson, S. & Lebsock, M. (2017). Course Design and Technology For Synchronous Interaction in an Online Course. Information Systems Education Journal (ISEDJ). 15 (5), 60-67.

Leontyeva, I. (2018). Modern Distance Learning Technologies in Higher Education: Introduction Problems. EURASIA Journal of Mathematics, Science and Technology Education, 14(10), 1-8.

Majdi, L. (2023).Shaping Tomorrow's Campus: 7 Pressing Technology Challenges in Higher Education. Education, Higher Ed, IT, Technology. Marketing for Cox Business. Accessed February 10, 2025 from https://www.coxblue.com/shaping-tomorrows-campus-7-pressing-technology-challenges-in-higher-education/.

Sahin, I. & Shelley, M. C. (2008). Considering students' perceptions: The distance education student satisfaction model. Educational Technology & Society, 11(3), 216-223.

Saykılı, A. (2018). Distance Education: Definitions, Generations, Key Concepts and Future Directions. International Journal of Contemporary Educational Research, 5(1). 1-17.

Smith, R. (2011). Role of Technology in Distance Learning Programs Term Paper Writing. Accessed March 22, 2025 from http://www.perfecttermpapers.com/blog/role-of-technology-in-distance-learning-programs-term-paper- writing/.

Wikipedia (2025). List of oldest universities in continuous operation. Accessed January 3, 2025 from https://en.wikipedia.org/wiki/.

Yilmaz, A.B. (2019). Distance and face-to-face students' perceptions towards distance education: a comparative metaphorical study. Turkish Online Journal of Distance Education-TOJDE. 20 (1), 191-207.

Brief Biography of Authors

Dr. Philip Idowu Ajewole obtained B.Ed., M.Ed. and Ph.D. in Educational Management, with his area of specialization in Personnel Administration from the University of Ilorin and the University of Ibadan, Nigeria. Also, he obtained a Master's in Managerial Psychology from the Department of Psychology, University of Ibadan. Ajewole was the immediate past Head of Department and a seasoned Senior Lecturer in the Department of Educational Management and Business Studies, Faculty of Education, Federal University Oye-Ekiti, Nigeria. He is a Chairman and member of various committees in the

University. He has more than 50 articles published in reputable journals to his credit. He reviews papers for International Academic Forum Journal of Education and Journal of Humanities, Art and Design as well as Faculty journals and Departments' journals in the Federal University Oye-Ekiti. Dr Ajewole is a member of various professional bodies such as the Chartered Institute of Personnel Management of Nigeria (CIPMN), Association of Nigerian University Professional Administrators (ANUPA), Teachers' Registration Council of Nigeria (TRCN), International Association for Innovations in Educational Assessment (IAIIEA), as well as International Council for Education, Research and Training (ICERT).

Dr. Amos Olusola Ogunjobi (Ph.D.) is a Lecturer I in the Department of Science Education, Faculty of Education, Federal University Oye-Ekiti, Nigeria.

Dr. Oyegbami Gabriel Aderibigbe (Ph.D.) is a Lecturer of Agricultural Science Education, Department of Science Education, Faculty of Education, Federal University Oye-Ekiti, Nigeria.

Dr. Olubunmi Kayode Ayanwoye (MMAN) is a Lecturer in Mathematics Education, Department of Science Education, Faculty of Education of the Federal University Oye-Ekiti, Nigeria. He holds a Ph.D. in Mathematics Education and his research interest covers Mathematics pedagogy, teacher professional development, general education, and the application of technology in STEM and general education. He has about thirty-five publications and is a peer reviewer for both local and international journals.

Dr. Sina Fakoyede is a Lecturer in the Department of Science Education, Faculty of Education, Federal University Oye-Ekiti, Nigeria. He had his Ph.D. from the University of Witwatersrand, Johannesburg, South Africa. His research interests are science, cultural studies, leadership, and socio-cultural issues in Education.

Dr. Taiwo Togunloju obtained his first degree in Economics Education (B. Sc. Ed.) from Ondo State University (now Ekiti State University), Ado-Ekiti in 1996. His second and third degrees (M.Ed. and Ph.D.) were obtained in Educational Management (Administration) in 2016 and 2019 respectively, from Ekiti State University, Ado-Ekiti. He taught Economics at Command Day Secondary School, Ojo Military Cantonment, Lagos between 2000 and 2012. Currently, he is a Lecturer in the Department of Educational Management and Business of Federal University Oye-Ekiti, Nigeria.

Dr. Oluwakemi Mogelola Anyanwu is a lecturer at the Department of Educational Management and Business Studies, Faculty of Education, Federal University, Oye-Ekiti, Ekiti State, Nigeria. She holds a Ph.D. in Educational Management from Ekiti State University, Nigeria, M.Ed. in Educational Administration and Planning from the National Open University, Nigeria, and a postgraduate diploma in Public Administration from the University of Sokoto, Sokoto State, Nigeria. Her research interests are administration and school effectiveness. She has published in reputable local and international journal and is a member of some professional organizations such as the National Association for Educational Administration and Planning (NAEAP); Higher Education Research and Policy Network (HERPNET); Commonwealth Council for Educational Administration and Management; and Teachers' Registration Council of Nigeria (TRCN).

Dr. Adieme Franca Ginikachi (Ph. D.) is a Lecturer II in the Department of Educational Management and Business Studies, Faculty of Education, of the Federal University Oye-Ekiti, Nigeria. Dr. Ginikachi has more than 50 publications in reputable local and international journals.

Leveraging Blockchain and AI to Enhance Accessibility and Quality in Higher Education

Shahbas Banu Jamsheed
Lecturer & Module Leader, Elizabeth School of London, UK
Shahbas.b@elizabethschool.com

Saira Mohamed Sherif
Course coordinator, Fairfield school of Business, UK
saira.mohamedsherif@fairfield.ac

Reshma Lucos
Lecturer, Elizabeth school of London, UK
Reshma.l@esl.ac.uk

Abstract

Emerging technologies such as Blockchain and Artificial Intelligence (AI) have revolutionized higher education by addressing critical challenges related to accessibility, academic integrity, and personalized learning experiences. This paper explores the transformative potential of these technologies in redefining the education landscape. The study analyses the role of Blockchain in securing academic records, fostering trust in credential verification, and enabling seamless global mobility for students. It further delves into the application of AI in adaptive learning systems, which tailor educational content to individual student needs, ensuring inclusivity and improved learning outcomes. Using a mixed-methods approach, this research incorporates case studies from universities that have adopted these technologies successfully, alongside survey data from educators and students to assess their impact. The findings suggest that the integration of Blockchain and AI not only enhances operational efficiency but also promotes equitable access to education for underrepresented demographics. The paper concludes with actionable recommendations for institutions to implement these technologies effectively while addressing ethical considerations and resource constraints. This research provides a roadmap for leveraging technological advancements to create a more inclusive, transparent, and student-centred higher education system.

Keywords: Blockchain, Artificial Intelligence, Higher Education, Accessibility, Adaptive Learning, Credential Verification, Equity, Technological Integration

Leveraging Blockchain and AI to Enhance Accessibility and Quality in Higher Education

Higher education is experiencing a significant transition due to the swift progress in technology. As artificial intelligence (AI) and blockchain technology become increasingly significant, institutions encounter both opportunities and problems in redefining educational outcomes and employment preparedness (Within, 2024). Conventional educational frameworks have predominantly reinforced theoretical information acquisition, frequently overlooking critical professional competencies and practical application. Consequently, numerous graduates encounter difficulties in entering the workforce, deficient in the critical thinking skills, professionalism, and practical experience that companies require (Tarigan et al, 2024). The increasing impact of AI-driven educational tools, automation, and decentralised digital credentials requires a reassessment of higher education's function in equipping students for evolving professional environments. Although AI customises learning and enhances efficiency, it concurrently poses the threat of passive information consumption and a decline in critical thinking (Denga and Denga, 2024). Similarly, blockchain provides safe and verifiable certification; however, it has not yet been completely incorporated into skill-based evaluation frameworks that extend beyond conventional grading systems (Nazir et al, 2024). The AI and Blockchain-Powered Career Passport seeks to tackle these issues by establishing a comprehensive framework that assesses student involvement, professional development, and career preparedness via a secure, verifiable, and skill-oriented certification system.

AI & Blockchain-Powered Career Passport: A Smart Credentialing System for Student Engagement, Professionalism, and Career Readiness in Higher Education

The Challenge: Lack of Critical Thinking, Professionalism, and Career Readiness

In the changing scope of higher education, students are anticipated to graduate with both theoretical knowledge and the requisite skills for workplace success. The existing system inadequately prepares students with vital critical thinking skills, professional competences, and industry-relevant expertise. This engenders increasing apprehension among graduates who feel ill-equipped to confront real-world issues. The principal issues leading to this issue encompass excessive dependence on AI, insufficient tracking of professionalism, prioritisation of theoretical learning over practical application, and deficiencies in career preparedness (Simpungwe, 2024).

Over-Reliance on AI and Its Impact on Critical Thinking. The growing availability of artificial intelligence (AI) tools has transformed how students engage with and comprehend academic material. Although AI serves as a crucial instrument for research and automation, numerous students have developed an excessive reliance on AI-generated content instead of participating in profound analytical thought. AI-driven writing aids, coding generators, and automated problem-solving systems provide students immediate solutions, although frequently diminish the necessity for autonomous thought (Arya and Verma, 2024). AI-generated essays and reports enable students to fulfil assignments with minimal exertion which gradually undermines their capacity to formulate arguments, analyze issues, and cultivate novel insights. Research indicates that students who depend significantly on AI technologies have diminished involvement in problem-solving activities and encounter difficulties with open-ended enquiries necessitating analytical reasoning. The result is a degradation in students' efficiency to employ critical thinking and reasoning in intricate real-world situations, rendering them less competitive in professional contexts that need imaginative problem-solving (Sagin et al, 2024). Universities could strike a balance between utilising AI for efficiency and ensuring that students participate in substantive intellectual activities. The implementation of AI-assisted coursework that promotes critical evaluation of

AI-generated content and the application of human reasoning could fill this gap. Furthermore, academic institutions ought to integrate coursework that necessitates original thinking and engaged discourse instead of mere information retrieval (Bahroun et al, 2023).

Lack of Professionalism Tracking and Soft Skills Evaluation. A significant difficulty in higher education is the inability to evaluate and monitor students' professionalism and soft skills. Conventional education systems predominantly emphasise academic achievement, frequently overlooking critical professional skills such as collaboration, timeliness, communication, and ethical judgement. Employers, however, highly appreciate these talents, as they are essential for success in the job. In contrast to technical talents, soft skills are not readily quantifiable through standardised assessments, rendering them challenging to evaluate with traditional grading systems. Consequently, individuals may attain exceptional academic records yet lack the essential interpersonal and organisational abilities needed to succeed in professional environments. Recent business polls indicate that most recruiters are apprehensive about graduates' deficiencies in critical workplace qualities, including teamwork, adaptability, and leadership. Universities must implement novel ways to monitor and evaluate professionalism in students. AI-powered professionalism assessment systems may be included into academic curricula, assessing students' engagement in collaborative projects, compliance with deadlines, and communication proficiency. Blockchain technology can maintain verifiable records of these parameters, enabling students to create an immutable professionalism profile for employers to reference throughout hiring processes. Such advances would guarantee the continual monitoring and validation of students' professional competencies in conjunction with their academic accomplishments.

Theoretical Learning Over Practical Application. Higher education institutions frequently prioritise theoretical training at the expense of practical learning experiences, resulting in a knowledge foundation that lacks real-world relevance. Although universities engage with partner institutions to offer comprehensive academic information, this content is frequently presented in a passive manner that fails to promote skill application. A multitude of students do exceptionally in examinations yet find it challenging to apply their knowledge to practical solutions in professional settings. Engineering students may acquire intricate mathematical theories yet encounter restricted opportunity to engage in practical engineering projects. Likewise, business students may possess proficiency in economic models yet lack practical experience in market analysis or corporate decision-making processes. The disparity between theoretical knowledge and practical application results in graduates who possess academic proficiency yet lack the essential problem-solving skills and practical experience demanded by their businesses. One method to narrow this gap is by incorporating experiential learning opportunities into academic curricula. Universities ought to prioritise internships, apprenticeships, and industrial partnerships that enable students to implement academic principles in professional environments. AI-driven skill evaluation tools can monitor students' advancement in utilising information in practical situations, whereas blockchain-secured portfolios can function as authentic records of their experiential learning. Implementing project-based learning methods, wherein students address real-world difficulties, would be crucial in equipping them with practical, job-ready abilities upon graduation.

Proposed Solution: The Career Passport Model

To address these shortcomings, an AI and Blockchain-Enhanced Career Passport that monitors student participation, professionalism, and career advancement through AI technology will be proposed. Utilizes blockchain technology to maintain verifiable, immutable credentials. Uses Smart Contracts to automate the certification and acknowledgement of skills. Utilises EduTokens to incentivise students for tangible accomplishments.

Literature Review

The incorporation of Artificial Intelligence (AI) with blockchain technology in higher education has garnered substantial traction, especially in domains concerning career preparedness, student involvement, and professionalism monitoring. Although some universities have initiated trials with AI-driven personalised learning systems and blockchain-based credential verification, the integration of these technologies to develop a comprehensive career preparedness model is still insufficiently examined (Das et al, 2025). Current research has predominantly concentrated on artificial intelligence for educational improvement and blockchain for safe documentation; nonetheless, the necessity for a comprehensive system that amalgamates skill tracking, professionalism evaluation, and verified career credentials persists as an unresolved difficulty.

AI for Career Guidance, Engagement, and Personalization

Artificial Intelligence is transforming higher education by facilitating individualised learning and data-informed evaluations. AI-driven platforms evaluate student learning patterns, delivering immediate feedback to enhance reasoning, creativity, and critical thinking abilities (Grajeda et al, 2024). In contrast to conventional educational frameworks that depend on standardised assessments, AI observes student engagement in academic tasks and assesses their capacity to implement concepts in practical scenarios. AI mitigates the excessive dependence on automated content generating systems by identifying passive learning behaviours (Diliberti et al, 2024). For instance, when students utilize AI to produce answers without exhibiting autonomous problem-solving, AI-driven platforms can intervene by necessitating further explanations or reasons. This guarantees that students interact with the material actively instead of relying exclusively on generative AI models (Kavitha and Joshith, 2024). Furthermore, AI allocates a Critical Thinking Score (CTS) derived from students' analytical involvement, establishing a quantifiable meter that monitors intellectual development over time. In addition to critical thinking, AI promotes student skill development by enabling personalised learning trajectories (Liu et al, 2024). By evaluating strengths and weaknesses, AI customizes learning experiences to address individual requirements, guaranteeing that students are persistently challenged in areas necessitating enhancement. This degree of customisation increases student involvement and provides learners with vital skills necessary for professional achievement (Essel et al, 2024). Recent studies underscore the increasing application of AI in career counselling and student engagement. Shah et al (2024) offers an AI-based career advising system that evaluates students' academic inclinations and personal interests to suggest future progress. This system, however, lacks integration of blockchain-based credential verification and does not monitor long-term skill improvement, resulting in deficiencies in job readiness validation (Zhao and Liu, 2024).Herath et al (2024) examines AI-based job recommendations derived from student evaluations and previous coursework; however, this model fails to incorporate engagement tracking and does not authenticate students' employability abilities using decentralised credentials. Artificial intelligence is being utilized to augment student engagement.Khurma et al (2024) investigated the applications of AI in enhancing student motivation and engagement, specifically within online learning contexts. Their research suggests that AI-driven personalised learning enhances academic engagement but fails to assess soft skills such as professionalism, leadership, or critical thinking. In the absence of a framework linking engagement levels to professional skill, these AI systems do not offer a complete assessment of student job preparedness.

Blockchain for Professionalism & Credential Verification

Blockchain technology offers a decentralised and immutable system for documenting and validating student accomplishments. In contrast to traditional academic transcripts that solely display grades, blockchain-based credentialing allows colleges to provide verifiable digital records that document a student's involvement, professionalism, and proficiency in skills pertinent to the business (Gupta et al, 2024).Blockchain technology provides students with Decentralised Identifiers (DIDs), affording them complete ownership and authority over their career records. These IDs facilitate the secure sharing of credentials with employers, circumventing the inefficiencies and delays inherent in manual degree verification. Furthermore, blockchain technology guarantees the transparent storage of professional skill certifications, industrial internships, and extracurricular accomplishments, thereby eradicating credential fraud (Any et al, 2024). From an employer's viewpoint, blockchain-augmented professionalism metrics enable hiring managers to evaluate not only a candidate's educational qualifications but also their engagement in collaboration, leadership positions, ethical judgement, and timeliness. By integrating these soft skills into a verified digital ledger, blockchain establishes a comprehensive career passport, providing an all-encompassing perspective of a student's professional growth.Blockchain is widely acknowledged for its capacity to secure academic records and mitigate credential fraud (Tran et al, 2024).Saydullayev (2023) examine the application of blockchain for facilitating transparent and immutable credential verification. Their research indicates that blockchain-based credentials may substantially diminish hiring bias by enabling companies to authenticate students' accomplishments directly, without intermediaries. However, the study excludes AI-based skill evaluations and real-time monitoring of professionalism.

The AI & Blockchain Career Passport Model seeks to rectify these deficiencies by incorporating AI-driven evaluations, blockchain-secured professional credentials, and automated smart contracts. This methodology presents an innovative and credible framework for monitoring professionalism and job preparedness, effectively addressing the disparity between educational outcomes and industry requirements. The swift advancement of technology is transforming higher education, facilitating more individualised, efficient, and competency-based learning experiences. Artificial Intelligence (AI), blockchain technology, and smart contracts are essential technologies transforming the methods by which institutions monitor student participation, evaluate competencies, and authenticate professionals. These developing technologies facilitate the graduation of students equipped with both academic knowledge and well-documented, provable soft skills and problem-solving capabilities that meet industrial standards (Rani et al, 2024).

Smart Contracts for Career Readiness & EduTokens

An emerging application of blockchain in education is using the power of smart contracts and EduTokens.Pondkule and Kothari (2025) examine the effectiveness of smart contracts to automate the issuance of credentials and to guarantee the integrity of student accomplishments. These contracts can be designed to confer micro-certifications following the successful completion of designated skills or internships, so reducing the administrative delays typically linked to conventional degree issuing. Edu Tokens function as digital incentives that compensate students for their active participation in skill development programs (Samala et al, 2024).In contrast to conventional grading systems that emphasise summative assessments, EduTokens serve as engagement-oriented rewards, guaranteeing that students are acknowledged for exhibiting problem-solving skills and professional conduct. To prevent passive learning, EduTokens are conferred solely when students demonstrate autonomous problem-solving and substantial engagement in academic and industry initiatives (Golam et al, 2024). AI monitors engagement patterns to prevent pupils who overly depend on generative AI without exercising critical thinking from receiving rewards. EduTokens progressively accrue in a student's blockchain-secured

Career Passport, enabling universities and companies to monitor their advancement transparently and verifiably (Vervest, 2021).The integration of AI-driven learning, blockchain-based credentialing, and smart contract automation offers a breakthrough approach for skill evaluation and professional growth in higher education. These improvements guarantee that students graduate with competencies pertinent to the industry that surpass conventional degree credentials. To deter passive learning, only students who actively participate in problem-solving tasks and critical thinking evaluations are awarded EduTokens (Son-Turan, 2022). AI evaluates students' engagement in debates, innovation-driven projects, and practical activities, guaranteeing that tokens are granted according to authentic skill enhancement (Chen et al, 2023). The Career Passport system signifies a significant transformation, enabling students to assume control of their educational paths while offering companies clear and reliable insights about graduate skills.

Gaps in Existing Research and the Need for an Integrated Career Passport

Notwithstanding the progress in AI and blockchain, a deficiency persists in complete models that include these technologies into a unified career preparedness framework. Contemporary AI systems emphasise academic involvement and career recommendations; nevertheless, they fail to monitor professionalism, interpersonal skills, or industry-specific competencies. Currently, blockchain technology has predominantly been utilised for the storage of static credentials, lacking interaction with real-time talent evaluations and professionalism indicators.

1. The proposed AI & Blockchain Career Passport Model in this research seeks to rectify these deficiencies by:
2. Employing AI to monitor student involvement, professionalism, and problem-solving skills, so enabling the dynamic evaluation of career preparedness indicators.
3. Establishing blockchain-secured career passports that retain verifiable records of academic and professional qualifications.
4. Implementing smart contracts for the automated issuing of certifications and EduTokens as incentives for significant learning and professional advancement.
5. Mitigating excessive dependence on AI-generated content by mandating that students participate in autonomous problem-solving prior to receiving rewards.

By integrating these elements, the Career Passport system provides students with a **transparent, verifiable, and dynamic** record of their academic and professional growth. This model aligns with the evolving demands of employers, who increasingly seek candidates with **demonstrated soft skills, real-world experience, and a track record of continuous learning**.

Artificial intelligence and blockchain possess considerable potential to revolutionise career preparedness in higher education. Although AI has improved personalised learning and career assistance, it has not yet been properly utilised for monitoring professionalism and employability skills. Likewise, blockchain guarantees safe credential verification; but, it does not incorporate real-time interaction analytics. Current research offers significant insights into the possible applications of these technologies; nevertheless, their complete integration into a cohesive career tracking and verification model has yet to be investigated. The AI & Blockchain Career Passport addresses this deficiency by integrating AI-driven professionalism monitoring, blockchain-ensured credential authentication, smart contract automation, and EduToken rewards into a cohesive career preparedness system. This innovation guarantees that students graduate with both a degree and a thorough, verified skill portfolio that accurately represents their abilities and readiness for the industry. This research enhances higher

education and career development by rectifying the deficiencies in current models, thereby fostering a sustainable, technology-oriented framework.

Conceptual Framework

The AI and Blockchain-Enhanced Career Passport Model offers a systematic method for improving student engagement, professionalism, and career preparedness via a cohesive technology framework. This conceptual framework delineates the function of Artificial Intelligence (AI), Blockchain, Smart Contracts, and EduTokens in revolutionising higher education evaluation, credentialing, and employability verification. Higher education institutions have typically depended on static evaluation systems, notably evaluating academic performance through tests and assignments. This method frequently neglects to assess a student's soft skills, engagement levels, and practical competence (Chang and Liu, 2024). The job Passport Model advocates for a transition to a dynamic, technology-based evaluation system, guaranteeing that graduates get degrees while simultaneously cultivating a validated, industry-relevant job profile (Latif and Zhai, 2024).

The Career Passport serves as a digital archive of student accomplishments, recording their academic advancement, professional skills, ethical behaviour, and employability attributes. AI-driven learning analytics assess student participation, monitoring their advancement in skill acquisition, cooperation, and industry partnerships (Ramasamy and Khan, 2024). The system offers tailored learning suggestions, enabling students to synchronise their educational path with professional goals. In contrast to conventional grading systems that prioritise memorisation, AI-driven evaluations emphasise critical thinking, problem-solving, and professional ethics (Porter et al, 2024). This guarantees that students actively participate in their learning process instead of passively absorbing content. AI consistently assesses student conduct, producing a Professionalism Score that is recorded on a blockchain ledger for transparency and validation (Basalti et al, 2024).

Blockchain technology bolsters the integrity of student credentials by establishing secure, tamper-resistant digital records of academic and professional accomplishments (Ramasamy and Khan, 2024). Traditional methods render degree certificates and transcripts susceptible to fraud and misrepresentation, resulting in hiring inefficiencies (Dave, 2024).Leveraging blockchain technology, students obtain Decentralised Identifiers (DIDs), which provide them complete authority over their academic and professional records. These identities enable graduates to securely disseminate their credentials to prospective employers, circumventing protracted verification procedures. Moreover, blockchain credentialing transcends academic success by documenting extracurricular accomplishments, internships, leadership positions, and ethical assessments, so providing employers with a comprehensive perspective of a candidate’s capabilities (Ghadge, 2024).

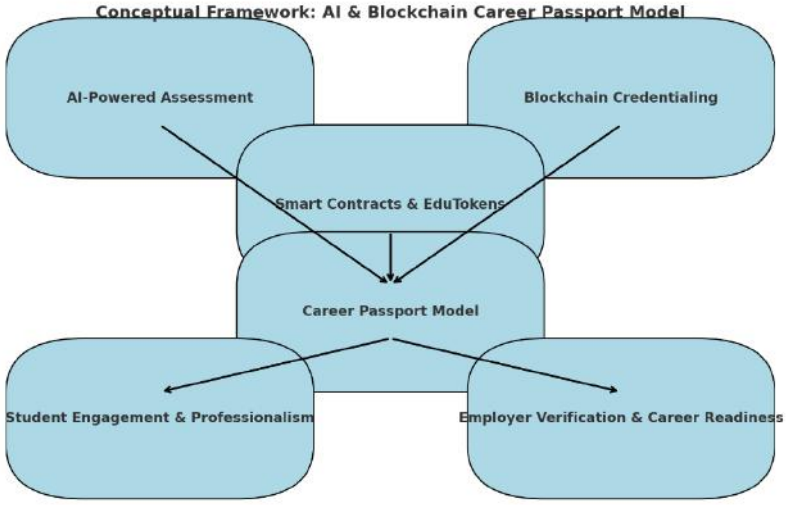
Smart Contracts enable the automated issuance of credentials, guaranteeing equitable, impartial, and prompt confirmation of skill attainment (Hossain, 2023). The conventional procedure for granting certifications is frequently protracted, encompassing numerous administrative tiers. The system autonomously issues micro-certifications following the fulfilment of specified academic or professional milestones through smart contracts (Meylani, 2023). For instance, upon the successful completion of an industry-based project by a student, the smart contract activates the issuance of a validated digital certificate, safely kept on the blockchain (Fartitchou et al, 2024). These smart contracts provide immediate verification, alleviating hiring impediments and administrative burdens for colleges. Employers and universities can authenticate a student's professional preparedness instantaneously without the need for third-party verification (Markou et al, 2022).

EduTokens implement a compensation system based on involvement, motivating students to partake in professional development, industrial initiatives, and skill enhancement activities (Garg et al., 2024). In contrast to conventional educational frameworks that mainly recognise academic accomplishments, EduTokens promote active learning and professional involvement (Silvestru et al,2024). Students receive tokens for finishing accredited curriculum, engaging in research projects, and exhibiting ethical leadership. These tokens may be redeemed for professional coaching, specialised training programs, industry certifications, and networking opportunities (Nazari et al, 2024). To prevent misuse, AI guarantees that EduTokens are conferred solely to students who actively participate in skill-enhancing activities, thereby deterring dependence on AI-generated content or passive involvement. Students that acquire substantial EduTokens receive preferential access to elite employment placements, internship possibilities, and leadership development programs (Garett et al, 2023).

The execution of the Career Passport Model adheres to a systematic procedure that guarantees students progressively cultivate competencies during their academic experience. The initial phase entails AI-facilitated career matching, when students participate in tailored career evaluations to discern their skills and professional inclinations (Mutiga,2024). AI subsequently proposes customised learning trajectories, aligning educational selections with market requirements. The second phase incorporates experiential learning inside the industry, providing students with internships, practical projects, and authentic case studies . AI evaluates their participation, collaboration, and problem-solving skills, perpetually revising their professionalism ratings. The third phase entails the issuance of blockchain-secured credentials, wherein accomplishments are permanently documented, hence mitigating fraud and guaranteeing verifiable credentials . The Career Passport is ultimately produced, offering a thorough and validated representation of student competencies. Employers can utilise a secure QR code or blockchain address to obtain this career passport, facilitating immediate authentication of academic and professional credentials (Kitto, 2024).

Figure 1

Career Passport Framework Model



Source: Self-created

The Career Passport Model provides substantial benefits for students, universities, and companies. It offers students a tailored learning experience that aligns educational advancement with professional objectives. The method minimizes dependence on conventional grading and instead advocates for competency-based evaluations, guaranteeing that graduates acquire demonstrable skills necessary for the workforce . Employers have immediate access to vetted personnel, mitigating the dangers linked to fake qualifications (Mohammed et al, 2024). The system monitors soft skills, like teamwork, timeliness, and leadership, enabling employers to assess both technical and interpersonal competencies prior to employment. Universities improve their reputation by generating industry-prepared graduates, increasing student employability rates, and fortifying partnerships with corporate entities.

The Career Passport Model encounters multiple hurdles, such as institutional acceptance, mitigation of AI bias, and issues over data privacy (Hude et al., 2024). Universities must be prepared to incorporate AI-driven evaluations and blockchain-based accreditation into their current frameworks (Babu, 2024). Moreover, it is essential to guarantee that AI models are equitable, impartial, and reflective of varied student demographics (Harris-Reeves et al., 2024). Ethical considerations must be addressed to prevent AI from perpetuating current prejudices in professional evaluations (Lin-Stephens et al., 2024). Additionally, the privacy of student data must be protected, with explicit procedures governing access to and verification of Career Passport credentials (Prakash et al., 2024). Subsequent study ought to investigate scalable pilot initiatives, involving educational institutions and industry leaders in assessing the tangible effects of Career Passports on employability results (Elkhodr et al., 2024).

The AI and Blockchain-Enhanced Career Passport Model offers a novel method for monitoring and authenticating student involvement, professionalism, and career preparedness in higher education. This methodology amalgamates Artificial Intelligence (AI), Blockchain technology, Smart Contracts, and EduTokens to establish a comprehensive, verifiable, and globally acknowledged credentialing system (Limata et al, 2024). The Career Passport functions as a digital, unalterable record of student abilities, guaranteeing that graduates enter the workforce with genuine, proven skills and validated professional accomplishments.The Career Passport Model aims to connect conventional educational indicators with practical employability abilities. This model, unlike traditional academic transcripts that only display grades, documents and authenticates students' engagement levels, critical thinking skills, professional behaviour, and industry-specific competences (Kisi, 2022). The model operates via AI-based student evaluation, blockchain credentialing, automated credentialing using smart contracts, and an EduToken incentive scheme. AI consistently evaluates student engagement, competency development, and professionalism indicators via academic endeavours, industrial partnerships, and practical applications. Blockchain guarantees secure, decentralised storing of student accomplishments, offering authenticity and safeguarding against fraudulent credentialing. Smart contracts facilitate the verification of skill acquisition, internship involvement, and competency-oriented education, whereas EduTokens function as an incentive system, enhancing participation in professional and academic advancement (Chen, 2025).

Artificial intelligence is crucial in monitoring and assessing student involvement, professionalism, and proficiency mastery. The system perpetually evaluates student behaviours and learning patterns to guarantee genuine engagement and efficient information retention. Students participate in AI-facilitated career evaluations, determining their skills, shortcomings, and chosen professional fields (Tan et al, 2023). AI actively suggests skill enhancement programs, pertinent industry courses, and experiential learning modules tailored to career paths. Adaptive learning mechanisms

adjust coursework, examinations, and engagement activities to optimise students' strengths and mitigate their limitations. AI assesses student collaboration, punctuality, ethical conduct, and leadership skills in both academic and professional settings (Tyagi and Tiwari, 2024). A Professionalism Score is designated to monitor student development over time in essential behavioural and ethical competences. This score is permanently recorded on the blockchain, guaranteeing authenticity for employers and educational institutions. Blockchain technology guarantees transparent, secure, and immutable accreditation for student accomplishments (). Every student receives a Decentralised Identifier (DID) that functions as their authenticated academic and professional profile, available to companies and institutions worldwide. Blockchain credentialing guarantees unalterable student records, decentralised access, provable soft skills, and metrics of professionalism. Employers can promptly validate pupils' accomplishments using blockchain-encoded credentials, guaranteeing the veracity of their professional advancement. The adoption of blockchain eradicates fake credentials and enhances hiring efficiency by granting companies immediate access to verifiable abilities and expertise (Saad et al, 2024).

Smart contracts facilitate the automation of credential issuance, guaranteeing equitable, impartial, and immediate validation of student accomplishments. These contracts are designed to activate upon students' successful completion of specified academic, technical, or professional milestones. The automation eradicates administrative inefficiencies and guarantees that certifications are conferred promptly and verifiably. Students engage in AI-assessed activities, like industrial internships, case studies, or leadership positions. Smart contracts autonomously generate certifications following the successful fulfilment of duties. Every credential is documented on the blockchain, hence removing administrative delays and the necessity for third-party verification (Beronic et al, 2024). Universities and employers can promptly authenticate student accomplishments, mitigating credential fraud and verification delays. EduTokens provide an engagement-driven learning economy, wherein students receive rewards for skill acquisition, ethical conduct, and active involvement in professional development endeavours. The incentive structure guarantees that students stay motivated to participate in substantive learning and skill development. EduTokens are conferred upon students who successfully finish accredited coursework, skill-oriented training, and industrial projects (Sharma et al, 2024). These tokens possess tangible worth, as they may be exchanged for supplementary courses, career guidance, certifications, and professional networking opportunities. AI oversees passive engagement or excessive dependence on AI-generated content, guaranteeing that only students who actively cultivate competencies receive EduTokens. Students exhibiting significant EduToken involvement are afforded preferential placement in internships, employment prospects, and career advancement programs, thereby promoting a culture of perpetual learning and professional distinction (Ishkov and Krupnov, 2024).

The Career Passport Model signifies a transformative change in higher education, transitioning from grade-centric evaluation to competency-based, industry-relevant, and verifiable skill assessment. This strategy offers multiple advantages for students, universities, and employers. Students gain advantages from customised learning trajectories, AI-enhanced educational experiences aligned with their abilities, and authentic job credentials that eradicate fake certificates. The Career Passport facilitates the measurement of industry-recognized professionalism measures, guaranteeing the acknowledgement and preservation of soft skills and ethical standards. EduTokens augment career growth prospects by granting access to premium mentorship, training, and exclusive employment possibilities (Abdullah et al, 2024). Employers gain immediate access to validated talent, mitigating hiring risks through real-time competency verification. The solution guarantees equitable and transparent credentialing via smart contracts that automate skill certification, ensuring impartial

acknowledgement. Utilizing blockchain-based storage mitigates credential fraud and guarantees the integrity of student records. Universities can utilise this scalable and future-proof solution to facilitate long-term skill tracking and workforce flexibility, guaranteeing that graduates are equipped for the changing labour market. The AI and Blockchain-Enhanced Career Passport Model signifies a pioneering educational advancement that revolutionises student assessment, credentialing, and career monitoring. This concept incorporates AI-driven talent evaluations, blockchain-secured professional documentation, and smart contract-based micro-certifications, ensuring that students graduate with a verified, industry-recognized job portfolio in addition to their degree. This evolution in higher education improves student employability, fosters professional development, and creates a sustainable, internationally recognised credentialing system.

Implementation Challenges & Ethical Considerations

The deployment of the AI and Blockchain-Enhanced Career Passport Model presents numerous problems and ethical dilemmas that require resolution for broad acceptance. This concept presents an innovative method for credentialing; nonetheless, higher education institutions and enterprises must address challenges with institutional uptake, AI equity, data security, and scalability. A primary problem is institutional opposition to change. Universities function within organised administrative systems that frequently depend on conventional evaluation and certification techniques. Transitioning to blockchain-based credentialing necessitates substantial investment in digital infrastructure, faculty training, and adherence to regulatory standards. Institutions could match blockchain credentialing with regulatory standards, including the General Data Protection Regulation (GDPR) and the Family Educational Rights and Privacy Act (FERPA), to ensure data protection and compliance. A significant concern is the bias and fairness of AI in student evaluations. AI-based assessments of professionalism, engagement, and skill growth may exhibit biases inherent in training datasets, potentially resulting in inequitable evaluations for marginalised groups. To avoid this risk, institutions must assure ongoing monitoring, openness, and the utilisation of varied datasets to enhance AI decision-making processes and avert discrimination in academic and professional evaluations.

Data security and student privacy raise additional ethical issues. Blockchain technology guarantees an unalterable record of academic qualifications; yet, the permanence of saved data prompts worries regarding student control over their records. Institutions must implement stringent data access regulations, guaranteeing that students retain ownership of their credentials while obstructing unauthorised alterations.

Scalability and interoperability provide further technological obstacles. The absence of standardised blockchain frameworks for educational records may result in compatibility challenges between colleges and employers. Implementing a universal standard will be essential for facilitating efficient credential verification and acknowledgement across institutions and employment sectors. Ethical considerations pertaining to the utilisation of EduTokens necessitate scrutiny. Although these tokens promote learning and professionalism, there exists a risk that students may prioritise the amassing of tokens over substantive participation. Universities must establish token distribution criteria that prioritise authentic talent development and mitigate misuse using safe smart contracts. Depsite these obstacles, the AI and Blockchain-Enhanced Career Passport Model presents a revolutionary option for higher education. Overcoming these obstacles via policy alignment, ethical AI development, and technology standardisation will be crucial for facilitating successful deployment. Subsequent research ought to concentrate on pilot implementations and cross-institutional studies to evaluate the model's influence on student engagement, professionalism, and job preparedness.

Conclusion & Future Scope

The AI and Blockchain-Enhanced Career Passport Model signifies a revolutionary change in higher education, reconfiguring the assessment and verification of student competencies, professionalism, and career preparedness. This strategy integrates AI-driven evaluations, blockchain-secured credentialing, and smart contracts to guarantee that students graduate with verifiable, practical skills instead of depending exclusively on conventional academic transcripts. The deployment of AI facilitates ongoing assessment of student involvement, critical thinking, and ethical conduct, whilst blockchain improves the security and dependability of certification. Despite the model's potential, obstacles including institutional adoption, AI bias, data security, and scalability require meticulous attention. Universities must adopt technological innovations by investing in infrastructure, faculty development, and adherence to regulations. Ensuring AI equity through varied training datasets and clear evaluation metrics is crucial to avert bias in assessments. Furthermore, privacy-preserving blockchain frameworks could be established to provide students with ownership of their credentials while facilitating secure and fast verification by businesses and institutions.

This model's future applicability encompasses business training, workforce development, and global certification verification, in addition to higher education. With the rise of blockchain use, a 23tandardized and interoperable system for career passports may enable the effortless recognition of credentials internationally. Subsequent research ought to concentrate on empirical pilot studies that evaluate the efficacy of AI-driven exams and blockchain certification in enhancing student employability and professionalism. Furthermore, partnerships within the business will be essential in enhancing EduToken reward structures to guarantee they promote substantial engagement rather than mere tokenism. The AI and Blockchain-Enhanced Career Passport Model have the capacity to transform education by promoting a competency-based learning framework. This methodology can overcome implementation obstacles and ethical issues, thereby connecting academia and industry, guaranteeing that students acquire skills that are verifiable, transportable, and linked with the changing demands of the workforce. Future developments in AI and blockchain will enhance this methodology, establishing career passports as a universal instrument for education-to-employment trajectories globally.

References

Aydin, F. and Başaran, C.H., 2025. Blockchain revolution: Transforming digital health for a secure future. In *Digital Healthcare, Digital Transformation and Citizen Empowerment in Asia-Pacific and Europe for a Healthier Society* (pp. 475-502). Academic Press.

Any, B., Ramadhan, T. and Nabila, E.A., 2024. Decentralized academic platforms: The future of education in the age of blockchain. *Blockchain Frontier Technology*, *3*(2), pp.112-124.

Arya, R. and Verma, A., 2024. Role of artificial intelligence in education. *International Journal of Advanced Research in Science, Communication and Technology*, *4*(2), pp.589-594.

Abdullah, A.A.H., Al-Hattami, H.M., Al-Hakimi, M.A. and Al Koliby, I.S., 2024. Blockchain adoption and its impact on sustainability of accounting education. *Environment, Development and Sustainability*, pp.1-21.

Basalti, C., Fazekas-Paragh, J., Forni, M., van Gelder, C., Hasani-Mavriqi, I., Janik, J., Kalová, T., Kuchma, I., Lindroos, H., Lütcke, H. and Pinnick, J., 2024. *Recommendations for data stewardship skills, training and curricula with implementation examples from European countries and universities*. EOSC Association.

Bahroun, Z., Anane, C., Ahmed, V. and Zacca, A., 2023. Transforming education: A comprehensive review of generative artificial intelligence in educational settings through bibliometric and content analysis. *Sustainability*, *15*(17), p.12983.

Beronić, D., Mihaljević, B. and Žagar, M., 2024. Exploring Real-World Practical Applications of Blockchain Technology in Education. In *ICERI2024 Proceedings* (pp. 10254-10259). IATED.

Chen, X., Zou, D., Cheng, G., Xie, H. and Jong, M., 2023. Blockchain in smart education: Contributors, collaborations, applications and research topics. *Education and Information Technologies*, *28*(4), pp.4597-4627.

Chen, Z., 2025. Revolutionising HRM practice with blockchain technology: unleashing disruptive paradigms of work and overcoming management challenges. *Technology Analysis & Strategic Management*, *37*(2), pp.125-138.

Chang, J. and Liu, D., 2025. Optimising learning outcomes: A comprehensive approach to virtual simulation experiment teaching in higher education. *International Journal of Human–Computer Interaction*, *41*(4), pp.2114-2134.

Das, S., Mutsuddi, I. and Ray, N., 2025. Artificial Intelligence in Adaptive Education: A Transformative Approach. In *Advancing Adaptive Education: Technological Innovations for Disability Support* (pp. 21-50). IGI Global Scientific Publishing.

Dave, C., 2024. *Security Challenges with Blockchain: Navigate Blockchain Security Challenges, Unveil Vulnerabilities, and Gain Practical Strategies for Secure Application Development (English Edition)*. Orange Education Pvt Ltd.

Diliberti, M., Schwartz, H.L., Doan, S., Shapiro, A.K., Rainey, L. and Lake, R.J., 2024. *Using artificial intelligence tools in K-12 classrooms*. RAND.

Denga, E.M. and Denga, S.W., 2024. Revolutionizing Education: The Power of Technology. In *Revolutionizing Curricula Through Computational Thinking, Logic, and Problem Solving* (pp. 167-188). IGI Global.

Essel, H.B., Vlachopoulos, D., Essuman, A.B. and Amankwa, J.O., 2024. ChatGPT effects on cognitive skills of undergraduate students: Receiving instant responses from AI-based conversational large language models (LLMs). *Computers and Education: Artificial Intelligence*, *6*, p.100198.

Fartitchou, M., Lamaakal, I., El Makkaoui, K., El Allali, Z. and Maleh, Y., 2025. BlockMEDC: Blockchain Smart Contracts for Securing Moroccan Higher Education Digital Certificates. *IEEE Access*.

Garg, K., Bhushan, S., Tyagi, P., Bansal, A. and Sharma, V., 2024, November. Harnessing Blockchain Potential: Merging Tokenomics with Project Earnings. In *2024 4th International Conference on Advancement in Electronics & Communication Engineering (AECE)* (pp. 806-811). IEEE.

Garett, R., Emish, M. and Young, S.D., 2023. Cryptocurrency as a new method for participant compensation in research. *Health policy and technology*, *12*(2), p.100746.

Ghadge, N., 2024. Analyzing the Role of Blockchain in Identity and Access Management Systems. *Available at SSRN 4872028*.

Grájeda, A., Córdova, P., Córdova, J.P., Laguna-Tapia, A., Burgos, J., Rodríguez, L., Arandia, M. and Sanjinés, A., 2024. Embracing artificial intelligence in the arts classroom: understanding student perceptions and emotional reactions to AI tools. *Cogent Education*, *11*(1), p.2378271.

Golam, M., Tuli, E.A., Alief, R.N., Kim, D.S. and Lee, J.M., 2024. Meta-Learning: A Digital Learning Management Framework using Blockchain for Metaverses. *IEEE Access*.

Gupta, N., Jain, R. and Chauhan, P.S., 2024, June. Reforming the Education System with Blockchain Technology. In *2024 International Conference on Integrated Circuits, Communication, and Computing Systems (ICIC3S)* (Vol. 1, pp. 1-5). IEEE.

Herath, D., Dinuwan, C., Ihalagedara, C. and Ambegoda, T., 2024. Enhancing Educational Outcomes Through AI Powered Learning Strategy Recommendation System. *International Journal of Advanced Computer Science & Applications*, *15*(10).

Hossain, K.A., 2023. Evaluation of technological breakthrough in global education and future employment opportunity. *Journal of Liberal Arts and Humanities (JLAH)*, *4*(8), pp.1-62.

Ishkov, A. and Krupnov, Y., 2024. Application of blockchain technologies for creation of innovative ecosystem in higher education. In *E3S Web of Conferences* (Vol. 549, p. 08031). EDP Sciences.

Kavitha, K.J.V.P. and Joshith, V.P., 2024. The transformative trajectory of artificial intelligence in education: The two decades of bibliometric retrospect. *Journal of Educational Technology Systems*, *52*(3), pp.376-405.

Khurma, O.A., Albahti, F., Ali, N. and Bustanji, A., 2024. AI ChatGPT and student engagement: Unraveling dimensions through PRISMA analysis for enhanced learning experiences. *Contemporary Educational Technology*, *16*(2), p.ep503.

Kitto, K., 2024, June. Will a Skills Passport ever get me through the lifelong learning border?: Two critical challenges facing personalised user models for lifelong learning. In *Proceedings of the 32nd ACM Conference on User Modeling, Adaptation and Personalization* (pp. 132-142).

Kişi, N., 2022. Exploratory research on the use of blockchain technology in recruitment. *Sustainability*, *14*(16), p.10098.

Latif, E. and Zhai, X., 2024. Fine-tuning ChatGPT for automatic scoring. *Computers and Education: Artificial Intelligence*, *6*, p.100210.

Liu, J., Ma, J. and Li, S., 2024. Research on school-based AI curriculum design and practice for cultivating computational thinking in high school students. *Education and Information Technologies*, pp.1-45.

Limata, P., Ceschel, F., Finocchietti, C., Marchegiani, L. and Spitalieri, S., 2024. The Human Side of Digital Technology: Supporting the Inclusion of Refugees in Higher Education Through Blockchain-backed EQPR. *International Journal of Business Administration*, *15*(2).

Markouh, O., Adadi, A. and Berrada, M., 2022, November. Smart Contracts in Higher Education: A Systematic Literature Review. In *International Conference on Advanced Technologies for Humanity* (pp. 195-206). Cham: Springer Nature Switzerland.

Mohammed, M.A., De Pablos-Heredero, C. and Botella, J.L.M., 2025. Blockchain Technology and the Future of Smart and Safe Workplaces. In *Global Economic Challenges and Opportunities for the Workplace* (pp. 89-120). IGI Global Scientific Publishing.

Mutiga, A.N., 2024. *AI Integration in Higher Education: A Content Analysis on AI Sophistication and Student Outcomes/Skill Development as Reported in Empirical Studies (2019-2024)* (Doctoral dissertation, University of Nevada, Reno).

Meylani, R., 2023. A comparative analysis of traditional and modern approaches to assessment and evaluation in education. *Batı Anadolu Eğitim Bilimleri Dergisi*, *15*(1), pp.520-555.

Nazir, R., Hussain, A. and Shah, S.Z.A., 2025. Blockchain as an indispensable asset for educational institutions: a systematic review. *International Journal of Electronic Security and Digital Forensics*, *17*(1-2), pp.45-59.

Nazari, Z., Vahidi, A.R. and Musilek, P., 2024. Blockchain and Artificial Intelligence Non-Formal Education System (BANFES). *Education Sciences*, *14*(8), p.881.

Othman, M., Osman, A., Abdullah, N. and Ahmad, S.Z., 2022. Impact of Student's Programming Experience on Cognitive Skills: Towards a Gamified Multimedia Learning Approach. *Asian Journal of University Education*, *18*(4), pp.944-953.

Pondkule, P.M. and Kothari, S., 2025. Implementation of blockchain-based document management system for higher education organizations. *International Journal on Smart Sensing and Intelligent Systems*, *18*(1).

Porter, D.B., Campbell, C., Jones, H., Logan-Fleming, D., l Sankey, M., Arumugam, P., Birt, J.R., Dickson-Deane, C., Dianati, S., Dowd, A. and Gander, T., 2024. Innovation Through Disruption in Australasia: The 2024 Contextualising Horizon Report. ASCILITE.

Rani, P., Sachan, R.K. and Kukreja, S., 2024. A systematic study on blockchain technology in education: initiatives, products, applications, benefits, challenges and research direction. *Computing*, *106*(2), pp.405-447.

Ramasamy, L.K. and Khan, F., 2024. Digital Identity System for Students. In *Blockchain for Global Education* (pp. 63-81). Cham: Springer Nature Switzerland.

Ramasamy, L.K. and Khan, F., 2024. Blockchain-Based Certification System: Ensuring Trust in Educational Credentials. In *Blockchain for Global Education* (pp. 125-145). Cham: Springer Nature Switzerland.

Samala, A.D., Mhlanga, D., Bojić, L., Howard, N.J. and Pereira Coelho, D., 2024. Blockchain technology in education: Opportunities, challenges, and beyond. *International Journal of Interactive Mobile Technologies*, *18*(1), pp.20-42.

Sağın, F.G., Özkaya, A.B., Tengiz, F., Geyik, Ö.G. and Geyik, C., 2024. Current evaluation and recommendations for the use of artificial intelligence tools in education. *Turkish Journal of Biochemistry*, *48*(6), pp.620-625.

Saydullaev, S., 2023, December. Transforming higher education: A comprehensive analysis of blockchain technologies and digitalization. In *International Conference on Next Generation Wired/Wireless Networking* (pp. 261-271). Cham: Springer Nature Switzerland.

Saad, A., bin Abdul Jamal, M.H. and bin Amran, A.R., 2024, January. Before the Badge: Tackling Initial Hurdles in Integrating Micro-Credentials at Institutes of Higher Learning. In *2024 18th International Conference on Ubiquitous Information Management and Communication (IMCOM)* (pp. 1-8). IEEE.

Shah, A., Pati, R., Pimplikar, A., Puthran, S. and Singh, A., 2024. Review Of Approaches Towards Building AI Based Career Recommender & Guidance Systems. *ScienceOpen Preprints*.

Sharma, R.C., de Bem Machado, A., Brito, I.S., dos Santos Pereira, F.M. and Sousa, M.J., 2024. Knowledge representation on innovations in learning processes and educational policies: infusing artificial intelligence and blockchain powers. In *Incorporating AI Technology in the Service Sector* (pp. 45-66). Apple Academic Press.

Silvestru, C.I., Firulescu, A.C., Iordoc, D.G., Icociu, V.C., Stoica, M.A., Platon, O.E. and Orzan, A.O., 2022. Smart academic and professional education. *Sustainability*, *14*(11), p.6408.

Simpungwe, F.C., 2024. *Development and Implementation of an Innovative Higher Educational Integrated Strategy for Preparing the Industry-Ready Future Workforce* (Doctoral dissertation, University of Liverpool).

Son-Turan, S., 2022. Fostering equality in education: The blockchain business model for higher education (BBM-HE). *Sustainability*, *14*(5), p.2955.

Tarigan, W.P.L., Paidi, P., Wiyarsi, A., Suhartini, S. and Fajri, S., 2024. Integrating Scratch with Project-Based Learning to Cultivate Students' Academic Performance. *Journal of Innovation in Educational and Cultural Research*, *5*(4), pp.723-735.

Tan, E., Lerouge, E., Du Caju, J. and Du Seuil, D., 2023. Verification of education credentials on European Blockchain Services Infrastructure (EBSI): action research in a cross-border use case between Belgium and Italy. *Big Data and Cognitive Computing*, *7*(2), p.79.

Tran, V.D., Ata, S., Tran, T.H., Lam, D.K. and Pham, H.L., 2023. Blockchain-powered education: A sustainable approach for secured and connected university systems. *Sustainability*, *15*(21), p.15545.

Tyagi, A.K. and Tiwari, S., 2024. The future of artificial intelligence in blockchain applications. In *Machine learning algorithms using scikit and tensorflow environments* (pp. 346-373). IGI Global Scientific Publishing.

Vervest, P., 2021. *Fast forward digital: A new kind of university* (No. EAL-2021-005-LIS).

Within, H.E.I.S., 2024. Driving Innovations: Trends, Prospects and Challenges of Implementing. *Advanced Technologies and the University of the Future*, p.237.

Zhao, L. and Liu, Y., 2024. Practical Exploration of College Students' Career Planning in the Perspective of Artificial Intelligence-Analysis Based on the GROW. *IC-ITECHS*, *5*(1), pp.667-672.

Brief Biography of Authors

Author: Shahbas Banu Jamsheed is an accomplished academic and mentor with over a decade of experience in higher education, specializing in Business Administration and Project Management. Currently serving as a Module Leader for undergraduate Business Management programs, Shahbas has made significant contributions to curriculum development, innovative teaching practices, and student mentorship. Shahbas has published works focusing on the integration of emerging technologies in education, including AI and Blockchain. With a strong commitment to fostering inclusive and student-centered learning environments, Shahbas actively engages in international conferences and collaborations to advance the education sector globally.

Saira Mohamed Sherif is a dedicated academic professional with a multidisciplinary background and extensive experience in educational leadership and management. She holds an MSc in Project Management from the University of Northampton, an MA in English Language and Literature, an MBA from the University of Kerala, and an International Teaching Diploma from the University of Cambridge. With a career spanning higher education institutions in the UK and internationally, she has demonstrated a strong commitment to fostering academic excellence and inclusive learning environments. Currently, Saira serves as a Course Coordinator at Fairfield School of Business, Sheffield, and contributes as a Lecturer at Elizabeth School of London. Her expertise lies in academic management, curriculum design, and quality assurance. In her prior roles, she has led initiatives that improved student engagement and satisfaction rates by 90% and developed skill development programs that empowered over 500 women through vocational training.

Reshma Lucos is an accomplished academic and educator specializing in Computer Science and Engineering, with over five years of experience in teaching and curriculum development. She holds a Master's in International Business Management from the University of Northampton, UK, and an MTech in Computer Science and Engineering from TKM Engineering College, India. Reshma has successfully completed a Level 5 Diploma in Education and Teaching as well as an AI Engineering course, equipping her with expertise in machine learning, data analytics, Python, and ethical AI. Currently a Lecturer at the Elizabeth School of London, Reshma teaches Business Management and Computing, employing innovative teaching methodologies to foster interactive and inclusive learning environments. She is also pursuing Associate Fellowship of the Higher Education Academy (AFHEA), reflecting her commitment to advancing excellence in higher education practices.

Evolution of Neo Banking in India – A Paradigm Shift in the Banking Industry

Suresh Naidu
Chairman, Tumkur University, India
bksuresh234@gmail.com

P. Paramashivaiah
Professor, Tumkur University, India
paramashivaiah@gmail.com

Y Muniraju
Professor, Mangalore University, India
drymuniraju97@gmail.com

R Shashidhar
Professor, Davangere University, India
Shashi.hbl@gmail.com

Abstract

The inaugural neobank, First Direct, was established in the UK in 1989. The term “neobank” became popular around 2017. Although these banks have been present for more than a decade, they have only recently started to gain popularity. The growing appeal of neobanks is attributed to their provision of a more convenient and user-friendly banking experience compared to traditional banks. Additionally, they can offer reduced fees and more attractive interest rates since they do not carry the same overhead expenses as conventional banks. In India, Niyo Solutions is among the pioneering companies in this field. These institutions operate exclusively online and provide a variety of services via digital channels. They emerged when tech-savvy financial service providers began to challenge traditional banking models. Some of the initial ventures appeared in the UK and Germany. Neobanks are entirely digital financial entities that resemble banks. Their service offerings are generally more limited when compared to traditional banks. This streamlined approach often enables neobank users to benefit from lower fees, competitive interest rates, and personalized products. They fill the gap between traditional banking services and the changing expectations of customers in the digital era. Over the last ten years, neobanks have effectively established a unique position for themselves by continuously broadening the array of services available to their clientele (Bradford, 2020). The growth and embrace of neobanks are showing no signs of abating, with Statista’s (2023) projections forecasting a global user base of 376.9 million by 2027, representing a twenty-fold increase from 18.95 million users in 2017. These trends signify a changing landscape in banking, although the degree to which neobanks compete with traditional banks is still uncertain. The remarkable growth potential of neobanks can largely be attributed to their cost-effective model for consumers, which often entails minimal or no monthly fees associated with banking services such as maintaining minimum balances, and making deposits and withdrawals.

Keywords: Neo bank, banking experience, digital financial entities, traditional banks, personalized products, changing expectations, clientele, landscape, remarkable growth

Evolution of Neo Banking in India – A Paradigm Shift in the Banking Industry

The inaugural neobank, First Direct, was established in the UK in 1989. The term “neobank” became popular around 2017. Although these banks have been present for more than a decade, they have only recently started to gain popularity. The growing appeal of neobanks is attributed to their provision of a more convenient and user-friendly banking experience compared to traditional banks. Additionally, they can offer reduced fees and more attractive interest rates since they do not carry the same overhead expenses as conventional banks. In India, Niyo Solutions is among the pioneering companies in this field. These institutions operate exclusively online and provide a variety of services via digital channels. They emerged when tech-savvy financial service providers began to challenge traditional banking models. Some of the initial ventures appeared in the UK and Germany. Neobanks are entirely digital financial entities that resemble banks. Their service offerings are generally more limited when compared to traditional banks. This streamlined approach often enables neobank users to benefit from lower fees, competitive interest rates, and personalized products. They fill the gap between traditional banking services and the changing expectations of customers in the digital era.

Over the last ten years, neobanks have effectively established a unique position for themselves by continuously broadening the array of services available to their clientele (Bradford, 2020). The growth and embrace of neobanks are showing no signs of abating, with Statista’s (2023) projections forecasting a global user base of 376.9 million by 2027, representing a twenty-fold increase from 18.95 million users in 2017. These trends signify a changing landscape in banking, although the degree to which neobanks compete with traditional banks is still uncertain. The remarkable growth potential of neobanks can largely be attributed to their cost-effective model for consumers, which often entails minimal or no monthly fees associated with banking services such as maintaining minimum balances, and making deposits and withdrawals.

Overview of Neo Banks

From 2018 to 2022, neobanks saw their transaction value rise from $0.45 trillion to $3.21 trillion, while their user base grew from 32.61 million to 188.4 million globally during the same timeframe (Statista, 2023). The remarkable growth potential of neobanks can largely be attributed to their cost-effective model for consumers, which often entails minimal or no monthly fees associated with banking services such as maintaining minimum balances, and making deposits and withdrawals. Elements like quicker loan approval and funding processes in comparison to conventional banks, along with lower interest rates through banking apps, are propelling market growth. Key factors influencing the expansion of neobanks—primarily linked to regulatory environments, consumer preferences, and competitive pressures—are likely to persist in the coming decades. Besides providing online services, neobanks are transforming the financial sector. In 2021, neobank Chime was recognized as one of the top 10 banks in the United States with over 13 million clients. Currently, it boasts more than 21 million users. As neobanks expand, it's crucial to grasp their nature and influence on the worldwide financial landscape.

Significance of Neo Banks

The remarkable expansion of neobanks and fully digital banks has led to a fundamental transformation in the banking system, resulting in a significant shift in the delivery of financial services to consumers (OECD, 2020). They set themselves apart through a completely digital approach and modern, innovative business strategies, rendering physical branches unnecessary for their operations

(Buchi et al., 2019). For a substantial part of the 20th century, traditional banking institutions held a dominant position in the financial services sector. These institutions initially provided services such as deposits, lending, and wealth management. As the 20th century progressed, traditional banking experienced a trend toward consolidation and notable deregulation, leading to the rise of large multinational banks. In the 21st century, these organizations effectively utilized technology to improve efficiency and expand their operations (Gorton, 2015). Despite the significant impact of digitalization on the structure and functions of conventional banking, many still rely heavily on physical branches and personal interactions as part of their customer service offerings. Neobanks represent a new banking paradigm that emerges from changing customer preferences and requirements. Emerging in the early 2010s, they are entirely reachable via the internet or mobile devices, employing technology to deliver a customer experience that includes services such as account creation, mobile payments, deposit options, savings and investment management tools, and various loan offerings. They also facilitate access to trading markets, including the stock market, commodities market, and cryptocurrency markets (Martinčević et al., 2022). Although several studies, including those by Gulieva et al. (2019) and Temelkov (2020), examine how neobanks' business models could potentially compete with traditional banks, statistics indicate that neobanks remain in a developmental stage. Consequently, academic research on this subject should continue to advance. The rapid growth of neobanks, the launch of new services, and emerging trends have created a gap in theoretical understanding regarding the current and future competitive landscape within the banking sector, as well as changes in customer preferences and behaviors. Therefore, a significant gap persists in the literature that evaluates the emerging opportunities for neobanks in the financial services sector, the potential risks they pose due to their newly established roles, how they differentiate themselves to customers, and their interactions with traditional banks.

Characteristic Appearances

Key characteristics and advancements provided by neobanks Neobanks represent a unique category of financial entities that exclusively operate online, usually without any physical locations. They offer their banking services through mobile applications and websites, prioritizing an easy, user-friendly, and completely digital experience for their clients. To implement innovative features such as instant transaction alerts, budgeting and investment tools, simple account registration processes, and access to a wide range of trading markets, including cryptocurrency and stock exchanges, neobanks often rely on technological progress (Gulieva et al., 2019). In contrast, traditional banks are well-established financial institutions with physical branch networks. They provide a variety of banking services, including savings and time deposit accounts, loans, mortgages, and select investment options. Thanks to their physical presence and Automated Teller Machines (ATMs), customers can access the services of traditional banks in person. Additionally, they typically offer a wide range of supplementary services such as wealth management, insurance, and financial planning.

In this way, neobanks provide several distinctive features and innovations that differentiate them from traditional banks. The primary defining characteristic of neobanks is their mobile-centric approach. They are designed for use primarily on mobile devices, making them more convenient for customers who are frequently on the move. Another important aspect is their emphasis on user experience. Neobanks are crafted to be straightforward and easy to navigate, with intuitive interfaces that facilitate financial management for customers. They also provide a variety of innovative services such as budgeting tools, savings objectives, and real-time alerts. Neobanks are also recognized for their affordability and accessibility. They do not incur the same overhead expenses as traditional banks, enabling them to offer more favorable rates to their clients. Lastly, neobanks are known for their rapid

and effective customer service. They utilize technology to deliver prompt responses to customer inquiries and issues.

Key Players in the Indian Neo Banking:

Several neo banks have emerged in India, each offering unique value propositions. Some of the prominent players include:

a) **Niyo**: Offers digital savings accounts, international debit cards, and wealth management services.
b) **InstantPay**: Provides business banking solutions, including current accounts, payment processing, and expense management.
c) **Jupiter**: Focuses on personal finance management with features like goal-based savings, spending insights, and reward programs.
d) **RazorpayX**: Targets businesses with services such as corporate accounts, payroll management, and automated payouts.

Future Outlook for Neobanks

The future possibilities for neobanks appear to be very promising. The main factor contributing to the increasing popularity of neobanks is their entirely digital nature and the ease of their services. These offerings allow customers to conduct banking activities from the comfort of their homes or any other location of their preference, removing the necessity of visiting physical branches (Padmanabhan, 2021). Despite the trend toward digitization in traditional banks, they still hold a substantial market share in the banking sector. However, recent trends and studies suggest a steady migration of clients towards banks that offer “online-only” solutions (Statista, 2023). The global neobank market is projected to expand at a CAGR of approximately 46.5% from 2019 to 2026, potentially generating around USD 394.6 billion by 2026. Factors such as the rising adoption of smartphones, the increasing demand for digital banking solutions, and the growing number of collaborations between traditional banks and fintech firms are driving the growth of the market. Some of the future opportunities for neobanks are highlighted below:

Market Expansion

With the rising trend of internet access and smartphone usage, neobanks are anticipated to attract more customers, particularly among the younger demographic, who are more inclined to utilize digital banking services (Nasir & Rizvi, 2020). Additionally, neobanks are strategically positioned to extend their offerings to unbanked and underbanked communities in developing markets (Demirgüç Kunt et al., 2018).

Technological Innovation

The area of efficiency has seen significant changes due to the introduction of modern and advanced technology. Banks have managed to automate a large portion of their operations, decreasing their reliance on manual labor, which has led to improved efficiency and a streamlined cost structure (Gulieva et al., 2019). Currently, banks are heavily utilizing Artificial Intelligence (AI) for various functions, including fraud detection and customer service automation (Digalaki, 2022). In this light, neobanks are set to continue leading the charge in adopting cutting-edge technologies like Artificial Intelligence, blockchain, and biometrics to deliver more efficient and secure banking solutions (Jabbari &

Ouerghi, 2020). For example, AI can be applied for enhanced risk assessment and tailored financial advice.

Partnerships and Ecosystem Development

Neobanks often depend on collaborations and partnerships with other financial service providers to deliver their offerings for multiple reasons. A primary reason is that these institutions typically lack the necessary infrastructure, regulatory approvals, and licenses to directly provide services like loans and credit cards. They are able to offer such services through their alliances with established financial entities, allowing them to do so without the need to invest in the necessary infrastructure or secure regulatory approvals independently (Koibichuk et al., 2021). They are likely to develop a comprehensive ecosystem through partnerships with fintech companies, traditional banks, and non-financial organizations to deliver a wider array of services, including lending, insurance, retail, and travel (Chen, 2020).

Novel Revenue Generation Models

Neobanks implement various methods for generating revenue and monetizing their services. A common model involves charging fees for specialized services such as overdraft protection, foreign currency exchanges, and ATM withdrawals. Some neobanks also impose charges on certain types of transactions, like wire transfers. Many of them entice customers with high-yield savings accounts that allow customers to earn interest on their deposits. Additionally, some neobanks offer investment opportunities such as mutual funds and Exchange-Traded Funds (ETFs), facilitating customers in investing their savings. Others partner with retail businesses to provide cashback incentives when customers use their debit cards for shopping. Other collaborations may include fintech firms to deliver supplementary services such as insurance products.

The future outlook for neobanks appears promising, they are projected to continue expanding rapidly in the coming years, driven by various factors like the increasing adoption of smartphones, the rising demand for digital banking services, and the growing collaborations between traditional banks and fintech companies. Neobanks are also likely to gain from the enhanced utilization of AI and ML technologies as well as blockchain advancements.

Challenges Faced by Neobanks

Though neobanks possess numerous benefits compared to traditional banks, they encounter several challenges. Given that the adoption of neobanks and digital banking is a relatively recent phenomenon, various potential hurdles exist.

Security Concerns and Cyber Threats

Cybercrime and hacking represent significant challenges or risks that can impact the banking sector and other online businesses (Larisa et al., 2019). The banking industry is especially susceptible to cyber threats because of the large volume of sensitive financial data it manages; unauthorized exposure of this information could result in serious ramifications. Ahsan et al. (2022) outline some of these risks, including malware attacks, Distributed Denial of Service (DDoS) attacks, phishing attacks, and insider threats.

Limited Brand Recognition

Another issue is the limited brand recognition. As neobanks are newcomers to the market, many individuals remain unfamiliar with them. This lack of familiarity can hinder neobanks in their efforts to draw in new clients. Additionally, an over-reliance on a partner may introduce various risks, such as potential conflicts of interest, diminished control over customer experiences, and total lack of brand visibility (Leffert, 2022).

Inconsistent Customer Loyalty

With the surge in neobanks and digital banking platforms, a primary hurdle these modern banks face is the lack of consistent customer loyalty. This poses a significant challenge when it comes to maintaining a stable customer base (Corander, 2021).

Regulatory Obstacles

Adhering to various regulatory requirements is another challenge that neobanks must navigate. Like their traditional counterparts, they are legally obligated to comply with the same regulations, which can be both resource-intensive and time-consuming. Additionally, they must emphasize strong security measures to protect their customers' information. Another complication for neobanks is the necessity of implementing appropriate laws and regulations for effective banking operations. Kokh & Kokh (2020) discuss the licensing challenges faced by numerous neobanks, which often leads them to register their businesses and partner with traditional banks, creating another issue—an over-reliance on such collaborations.

Profitability and Scalability Challenges

Most neobanks are still in their growth phases and have not yet reached profitability. Achieving scalability while upholding a lean cost structure presents a notable challenge (Stoughton & Nagar, 2019). Providing services at lower prices, a strategy frequently adopted by many neobanks, can undermine their capacity to generate and maintain revenue. Moreover, their operational frameworks require substantial investments in technology, resulting in high expenditures.

Intense Competition

In a saturated market, competition is fierce. Neobanks must continuously innovate and distinguish their offerings to retain existing customers and attract new ones (Nasir & Rizvi, 2020). Traditional banks have begun providing digital banking services that closely resemble those offered by neobanks. Additionally, other fintech firms are entering the market, making it increasingly challenging for neobanks to differentiate themselves.

Strategies for Tackling Challenges

Despite the various obstacles and security risks facing the neo-banking sector, there are numerous actions that neobanks can take to alleviate or avoid these issues. Some of these are elaborated below:

- Establishing robust compliance and risk management frameworks: It is crucial for neobanks to comply with all applicable regulations and implement strong security protocols to protect their

clients' information. Additionally, they must recognize potential threats and develop plans to manage them efficiently.

- Fostering strong customer connections and engagement: Neobanks should work towards cultivating strong relationships with their clients to promote trust. This can be accomplished by providing exceptional customer support, being transparent about charges and fees, and innovating their product and service offerings.
- Exploring novel revenue streams and partnerships: Neobanks should seek out fresh revenue opportunities and partnerships. This could mean working alongside other firms to offer supplementary services or designing new products tailored to their customers' preferences.
- Enhancing customer acquisition and retention strategies: Neobanks must create effective approaches for gaining and retaining clients. This may involve providing incentives for opening accounts, ensuring excellent customer service, and implementing loyalty initiatives.
- Focusing on improved cybersecurity and data protection: Neobanks need to prioritize investments in cybersecurity to safeguard their clients' data. Like other sectors, banking is continuously evolving to find ways to protect itself from the ongoing threat of cyberattacks. Some protective strategies include: increasing cybersecurity awareness among staff and providing appropriate training (Abdulrahman et al., 2020), utilizing data encryption (Lakhani, 2018), applying multi-factor authentication (Ometov et al., 2018), planning for incident response (Ghelani et al., 2022), and managing third-party risks (Serkebayev, 2023).

Conclusion

Neobanks have the capacity to transform the banking landscape through technological advancements and customer-focused strategies. Undoubtedly, neobanks have surfaced as a revolutionary force within the banking sector. Nevertheless, they confront several hurdles, such as regulatory adherence, cybersecurity challenges, and difficulties in customer acquisition and retention. Despite these obstacles, the future appears promising for neobanks. To maintain growth and compete effectively, they must tackle issues like regulatory compliance, scalability, cybersecurity, and differentiation. They are ideally situated to capitalize on the increasing demand for digital banking solutions. As a rising number of consumers embrace mobile banking and other digital services, their growth and expansion will likely continue. To gain an edge in competition, they must innovate and create new offerings. Furthermore, they should establish strong connections with their clients and earn their trust. By doing so, they can navigate the challenges they encounter and continue to progress and prosper in the years to come.

References

Abuladze, B. (2022). The Future of Neobanking. Business Administration Research Papers, 7.

Alaeddine Ziouache, Mohamed Bouteraa, 2023, Descriptive Approach of Neo-Banking System: Conception, Challenges and Global Practices, International Journal of Business and Technology Management, ISSN: 2682-7646, Vol. 5.

Bataev, A., & Bataeva, K. (2021, October). Challenger banks performance model. In Proceedings of the 3rd International Scientific Conference on Innovations in Digital Economy (pp. 425-433).

Bradford, T. (2020). Neobanks: Banks by any other name. Federal Reserve Bank of Kansas City, Payments System Research Briefing, August, 12, 1-6.

Danevska, B. A. (2021). Reinvention of New Banking Business Models in Republic of North Macedonia. Trends in Economics, Finance and Management Journal (TEFMJ), 3(2), 42-52.

Dhanraj Jaglan, 2021, NEO BANKS - The Rise of Banking Industry, International Journal of Management and Commerce Innovations, Issue 1, Vol. 9.

Dokania, Y. (2020). Neo Bank- Revolution in Indian Banking Sector- A Critical Analysis. Inetranational Journal of Law Management & Humanities, 03(06), 361-374.

Dokania, Y. (2020). NEO Bank-Revolution in Indian Banking Sector-A Critical Analysis. Issue 6 Int'l JL Mgmt. & Human., 3, 361.

Elroy Monis and Ramesh Pai, 2023, Neo Banks: A Paradigm Shift in Banking, International Journal of Case Studies in Business, ISSN: 2581-6942, Vol. 7.

Ganeshkumar, 2022, Neo Banking: The Future of Banking in India, International Journal of Creative Research Thoughts, Issue 1, Volume 10

Kavya Shabu, R. Vasanthagopal, 2022, Neobanking in India: Opportunities and Challenges from Customer Perspective, International Conference on Innovative Computing & Communication.

Lindström, V., & Nilsson, O. (2023). The sudden rise of neobanks and the threat it poses upon the traditional banking system.

Monis, E., & Pai, R. (2023). Neo banks: A paradigm shift in banking. International Journal of Case Studies in Business, IT and Education (IJCSBE), 7(2), 318-332.

Priya Raman, Angad Tiwary, 2022, Neo Banks: Future Of Indian Banking System, UGC Care Group 1 Journal, ISSN: 0378 – 4568.

Rangaswamy, E., Nadipilli, N., & Nawaz, N. (2022). RETRACTED CHAPTER: A Comparative Study of Traditional Bank A and Digital Bank B from an Organizational Innovation Perspective. In Communication and Intelligent Systems: Proceedings of ICCIS 2021 (pp. 489-507). Singapore: Springer Nature Singapore.

Ravichandran, S. Muralidhar and N.R. Naresh, April: 2022, Neo banks, fintech, and banking -the changing landscape – a perspective – on dangers, Growth, opportunities – a critical study, International Journal of Multidisciplinary Educational Research, ISSN: 2277-7881, VOLUME:11, ISSUE:4(6).

Reepu, R. (2023). Banking of the Upcoming Age: Neo Banks. In Cultural Marketing and Metaverse for Consumer Engagement (pp. 38-50). IGI Global.

Sardar, S., & Anjaria, K. (2023). The future of banking: how neo banks are changing the industry. International Journal of Management, Public Policy and Research, 2(2), 32-41.

Sibanda, W., Ndiweni, E., Boulkeroua, M., Echchabi, A., & Ndlovu, T. (2020). Digital technology disruption on bank business models. International Journal of Business Performance Management, 21(1-2), 184-213.

Umme Asma, Johnsy Mary Johnson and Gisa George, 2022, A Study On Challenges And Future Of Neobanks In India, International Journal of Early Childhood Special Education, ISSN: 1308-5581, Vol 14, Issue 04.

Yasmin. A. Barodawala, July – September 2022, Neo banking: an innovative window of banking arena, GAP iNTERDISCIPLINARITIES, A Global Journal of Interdisciplinary Studies, Volume – V, Issue III.

Brief Biography of Authors

Dr. Suresh B.K. is a highly accomplished and versatile academician, researcher, and administrator with an extensive and distinguished career in the field of commerce and management. He holds multiple prestigious qualifications, M.Com, MBA, MFM, M.Phil, ICWA, Ph.D. He has successfully completed FDPM from Indian Institute of Management (IIM), Ahmedabad. He has also obtained certificate courses in the fields of Entrepreneurship, Behavioural finance, Venture Capitalfrom the worlds best universities Stanford, Wharton, London Business School, Duke, Yale. He has also completed Nurturing Future Leadership programme from IIM Trichy. Dr. Suresh B.K. has guided numerous Ph.D. scholars to successful completion of their doctoral studies. His expertise spans across diverse areas of commerce, finance, and management, positioning him as a leading figure in the academic community. He has an impressive publication record, with over 100 research articles published in reputed national and international journals. As an administrator, Dr. Suresh B.K. has held key leadership positions, demonstrating strong strategic and operational capabilities such as Principal, Chairman, Dean, and Chief Finance Officer. Dr. Suresh B.K.'s dedication to advancing knowledge and mentoring future generations of scholars underscores his reputation as a thought leader and an influential figure in the field of commerce and management.

Prof. Paramashivaiah P. is a distinguished senior professor, renowned for his versatility as an academician, researcher, and administrator. He holds an impressive array of qualifications in the areas of Commerce and Management. With a wealth of experience in academia, Dr. Paramashivaiah P. has successfully guided numerous Ph.D. scholars, shaping the next generation of researchers and academicians. His scholarly contributions are substantial, with over 200 research articles published in reputed national and international journals, reflecting his deep expertise and research acumen. Dr. Paramashivaiah P. has also gained global recognition, having travelled extensively to many countries to present his research and engage with the global academic community. He has had the honor of publishing papers in several of the world's leading universities, further cementing his reputation as a thought leader in the field of commerce and management. As an administrator, he has held key leadership positions, demonstrating strategic vision and operational excellence in academic governance. His commitment to research, teaching, and academic leadership continues to have a profound impact on the institutions and scholars he has been associated with.

Prof. Y. Muniraju is a highly respected senior professor, widely known for his extensive expertise in Accounting, Finance, and Entrepreneurship. His academic journey is a testament to his dedication and perseverance, having risen from humble beginnings as the son of a farmer to achieving the prestigious position of Vice Chancellor. A versatile academician, researcher, and administrator, Prof. Y. Muniraju has guided numerous Ph.D. scholars, shaping the future of research and academia. His scholarly contributions are remarkable, with over 150 research articles published in reputed national and international journals, including papers presented and published in some of the world's leading universities. Prof. Y. Muniraju's leadership extends beyond research, as he has held key administrative positions with distinction, demonstrating strategic vision and operational excellence in academic governance. Known for his simplicity and humility, Prof. Y. Muniraju is deeply committed to the cause of higher education and has consistently supported the student community. His approachable nature and willingness to help students have made him a beloved figure in the academic world. Prof. Y. Muniraju's

extraordinary journey from rural roots to academic excellence stands as an inspiring example of dedication, resilience, and the transformative power of education.

Prof. Shashidhar R. is a distinguished Professor, Dean, and Chairman of the prestigious Management Department Institute of Management Studies at Davangere University. He is widely recognized for his extensive expertise in a broad range of fields, including Human Resource Management (HRM), Strategic Management, Sustainable Development, Sustainable Insurance, Sustainability, Green Practices, Environmental, Social, and Governance (ESG), Global Reporting Initiative (GRI), Behavioral Finance & Analytics, Social Media, Competitive Intelligence, and Corporate Social Responsibility (CSR). Prof. Shashidhar R. has guided numerous Ph.D. scholars, contributing significantly to the advancement of knowledge and research. He has published over 100 research articles in reputed national and international journals, with his work featured in several of the world's leading universities. His professional journey is inspiring—rising from humble beginnings as a common man to holding key leadership positions such as Registrar, Controller of Examinations, and Finance Officer of a university. Prof. Shashidhar R. has also gained global recognition, having extensively travelled to many countries to present his research and engage with the international academic community. Prof. Shashidhar R.'s career is a testament to resilience, intellectual depth, and a genuine dedication to advancing knowledge and empowering future generations.

The Role of Mobile Learning Platforms in Expanding Higher Education Access in Remote Regions of Kyrgyzstan

Elira Turdubaeva
Head, Journalism and Mass Communications Program, International Ala-Too University, Kyrgyzstan

Abstract

This research examines how mobile learning platforms can transform access to higher education in Kyrgyzstan's remote regions. The study employs a mixed-methods approach, combining quantitative enrollment data analysis, qualitative interviews with students and faculty, and technological infrastructure assessments in Kyrgyzstan's remote regions. The research investigates key factors including infrastructure requirements, cost-effectiveness, and learning flexibility in mobile education delivery. The study assesses challenges such as network reliability in mountainous regions, device affordability, and pedagogical adaptation needs. Data collection focuses on implementation strategies, including offline content capabilities, mobile-optimized course design, and faculty development programs. Expected outcomes include developing a framework for effective mobile learning implementation in remote areas and policy recommendations for strengthening mobile education infrastructure. This research contributes to understanding how emerging technologies can address educational inequities in developing regions while providing practical insights for educational institutions and policymakers implementing mobile learning solutions in remote areas.

Keywords: mobile learning, higher education access, Kyrgyzstan, remote education, educational technology

The Role of Mobile Learning Platforms in Expanding Higher Education Access in Remote Regions of Kyrgyzstan

Kyrgyzstan, a landlocked Central Asian nation characterized by its rugged mountainous terrain, faces significant challenges in providing equitable access to higher education for its population. While urban centers like Bishkek and Osh house established universities, students from remote regions often face insurmountable geographical, financial, and infrastructural barriers to accessing traditional higher education (Akyol & Garrison, 2011). The mountainous topography that defines much of the country creates isolated communities where physical access to educational institutions requires extensive travel or permanent relocation, options that remain financially prohibitive for many rural families (Ismailova et al., 2017).

In recent years, mobile technology has emerged as a potentially transformative force in educational access globally. With mobile phone penetration in Kyrgyzstan reaching approximately 134% as of 2021, indicating multiple device ownership among many citizens, mobile devices represent an increasingly ubiquitous technology even in remote areas (International Telecommunication Union [ITU], 2021). This technological landscape offers promising opportunities for delivering higher education content to previously underserved populations through mobile learning platforms.
Mobile learning (m-learning) refers to educational methodologies and technologies that leverage portable, internet-capable devices such as smartphones and tablets to deliver educational content, facilitate student-teacher interactions, and support assessment processes independent of physical location (Traxler, 2018). The flexibility inherent in m-learning approaches holds particular relevance for geographically isolated learners, potentially addressing the acute educational disparities that characterize Kyrgyzstan's urban-rural divide (Seitkazinovna, 2020).

This research aims to systematically investigate the potential of mobile learning platforms to expand higher education access in Kyrgyzstan's remote regions by addressing several critical questions: What technological, pedagogical, and infrastructural requirements must be met for effective mobile learning implementation in these regions? How can mobile learning platforms be optimized to overcome the unique challenges presented by remote mountainous communities? What policy frameworks and institutional adaptations are necessary to support sustainable mobile learning ecosystems in the Kyrgyz context?

By investigating these questions through rigorous empirical research, this study seeks to contribute actionable insights for educational policymakers, institutional leaders, and technology developers working to bridge educational divides in Kyrgyzstan and similar developing contexts.

Literature Review

The Higher Education Landscape in Kyrgyzstan

Since gaining independence from the Soviet Union in 1991, Kyrgyzstan has undergone significant transformations in its higher education system. The post-Soviet era saw rapid expansion in the number of higher education institutions, from 9 in 1991 to over 50 public and private institutions today (Merrill, 2016). Despite this numerical growth, quality concerns and geographical distribution imbalances persist. DeYoung (2011) notes that higher education institutions remain heavily concentrated in Bishkek and Osh, leaving rural regions underserved.

The centralization of educational resources creates significant disparities; according to the National Statistical Committee of Kyrgyzstan (2020), while approximately 60% of the population resides in rural areas, only 23% of higher education students come from these regions. Thieme (2017) argues that this disparity stems not from lack of interest, but from structural barriers including prohibitive relocation costs, inadequate preparatory education, and cultural factors that discourage rural youth, particularly women, from relocating to urban centers for education.

Mobile Technology Adoption in Kyrgyzstan

Mobile technology has seen remarkable adoption rates across Kyrgyzstan, even in remote areas where other infrastructure remains underdeveloped. Gryaznov and Urdaletova (2019) document that mobile phone ownership has penetrated even the most isolated mountain communities, with basic feature phones being nearly universal and smartphone adoption rapidly increasing, particularly among younger demographics.

While high-speed internet availability remains inconsistent in remote regions, mobile network coverage has expanded significantly. Baialieva and Arzymatova (2022) report that approximately 78% of the country's territory now has at least basic mobile network coverage, though 3G and 4G availability becomes increasingly sporadic in mountainous areas. This technological foundation, while imperfect, provides a potential pathway for educational content delivery that traditional infrastructure development would require decades to match.

Mobile Learning in Developing Contexts

Mobile learning research in developing countries has expanded significantly in recent years. Aker et al. (2016) demonstrated through randomized controlled trials in Niger that even basic mobile phone interventions could significantly improve learning outcomes in adult education programs. Closer to the Central Asian context, Mishra (2018) documented successful mobile learning implementations in Mongolia, another mountainous nation with dispersed rural populations.

Several factors emerge as critical to successful mobile learning implementation in resource-constrained environments. Traxler and Kukulska-Hulme (2016) identify key considerations including offline content accessibility, low-bandwidth optimization, device affordability, and cultural appropriateness of both technology and content. Winters (2013) emphasizes that successful mobile learning in developing contexts requires designing for the actual technology available to learners rather than ideal technological conditions.

Pedagogical Approaches for Mobile Learning

Effective mobile learning extends beyond technology access to encompass appropriate pedagogical approaches. Lan and Sie (2010) argue that mobile learning requires reconceptualizing traditional pedagogical models, with a shift toward microlearning approaches that break content into manageable segments suited to mobile consumption. Hashemi et al. (2011) emphasize that mobile learning should leverage the unique capabilities of mobile devices, including location awareness, social connectivity, and multimedia capabilities, rather than simply transferring traditional educational content to smaller screens.

In contexts like Kyrgyzstan, where traditional educational approaches remain dominant, pedagogical adaptation represents a significant challenge. Bekeshova (2019) notes that Kyrgyz higher education continues to emphasize instructor-centered approaches with limited student engagement, a model poorly suited to mobile learning environments that require greater student autonomy and self-direction.

Research Gaps

While existing literature provides valuable insights into both Kyrgyzstan's educational challenges and mobile learning potential, significant research gaps remain. First, most mobile learning studies in developing contexts focus on basic education rather than higher education delivery (Crompton & Burke, 2018). Second, the specific challenges of mobile learning implementation in mountainous regions with intermittent connectivity remain underexplored (Baialieva & Arzymatova, 2022). Finally, there is limited research on the institutional and policy frameworks necessary to support sustainable mobile learning ecosystems in Central Asian contexts (DeYoung, 2011).

This research aims to address these gaps by providing a comprehensive investigation of mobile learning potential specifically focused on higher education delivery in Kyrgyzstan's remote regions, with attention to the unique geographical, infrastructural, and cultural factors that characterize these contexts.

Theoretical Framework

This research is guided by three complementary theoretical frameworks that together provide a comprehensive lens for understanding mobile learning implementation in Kyrgyzstan's remote regions.

Technology Acceptance Model (TAM)

The Technology Acceptance Model, originally developed by Davis (1989) and extended by numerous scholars since, provides a framework for understanding how users come to accept and use technological innovations. TAM posits that perceived usefulness and perceived ease of use are primary determinants of technology adoption. In the context of mobile learning in Kyrgyzstan, TAM helps identify factors that may influence student and instructor willingness to engage with mobile learning platforms.

As Venkatesh and Davis (2000) argue, TAM factors are moderated by cultural and contextual variables, making it essential to investigate how Kyrgyz cultural perspectives on education and technology may influence perceived usefulness and ease of use in remote communities.

Community of Inquiry Framework

The Community of Inquiry (CoI) framework developed by Garrison et al. (2000) conceptualizes effective online learning environments as requiring three interdependent elements: cognitive presence, social presence, and teaching presence. This framework provides a valuable lens for examining how mobile learning platforms can facilitate meaningful educational experiences despite physical separation between instructors and learners.

In the Kyrgyz context, where communal learning traditions remain strong, particular attention must be paid to how mobile learning platforms can support social presence—the ability of learners to project themselves socially and emotionally—in virtual environments (Akyol & Garrison, 2011).

Capability Approach

Sen's (1999) Capability Approach offers a normative framework for evaluating educational interventions based on their contribution to expanding individual freedoms and capabilities rather than merely providing access to resources. This approach emphasizes that educational value is realized only when individuals can convert educational resources into actual capabilities that they value.

When applied to mobile learning in Kyrgyzstan, the Capability Approach directs attention beyond technology provision to examine whether mobile learning actually expands educational capabilities for remote learners, considering factors such as language accessibility, cultural relevance, and alignment with valued economic opportunities (Walker, 2006).

Together, these three frameworks provide complementary perspectives that guide this research in examining technological adoption factors, pedagogical effectiveness, and genuine capability expansion through mobile learning initiatives in Kyrgyzstan's remote regions.

Methodology

Research Design

This study employs a sequential mixed-methods design combining quantitative and qualitative approaches to provide a comprehensive understanding of mobile learning potential in Kyrgyzstan's remote regions. The research unfolds in three phases:

1. **Exploratory Phase**: Qualitative data collection through stakeholder interviews and site visits to establish contextual understanding and refine research instruments.
2. **Quantitative Phase**: Survey implementation and technological assessment to gather broad data on current conditions and needs.
3. **Explanatory Phase**: In-depth case studies of pilot mobile learning implementations to provide rich contextual understanding of challenges and opportunities.

This sequencing allows initial qualitative insights to inform quantitative instrument design, while subsequent qualitative investigation helps explain and contextualize quantitative findings (Creswell & Clark, 2017).

Sampling Strategy

The research employs purposive sampling to focus on three representative remote regions of Kyrgyzstan with varying geographical and infrastructural characteristics:

1. **Naryn Province**: Representing high-altitude mountain communities with significant connectivity challenges.
2. **Batken Province**: Representing remote border regions with complex access issues.
3. **Talas Province**: Representing agricultural communities with moderate remoteness.

Within each region, participants will include:

- Higher education administrators (n=10-15)
- Faculty members (n=20-25)
- Current higher education students from remote regions (n=50-60)
- High school graduates from remote communities (n=50-60)
- Telecommunications providers and infrastructure specialists (n=8-10)
- Government education officials (n=5-8)

This sampling approach ensures representation of diverse stakeholder perspectives and geographical contexts while remaining logistically feasible.

Data Collection Methods

Multiple data collection methods will be employed:

1. **Semi-structured interviews** with administrators, faculty, government officials, and telecommunications providers to understand institutional readiness, regulatory considerations, and infrastructure capabilities.
2. **Focus group discussions** with students and recent graduates to explore educational needs, technology usage patterns, and perceived barriers to higher education.
3. **Technology assessment surveys** to gather quantitative data on device ownership, internet access, digital literacy, and technology usage patterns among potential learners.
4. **Site observations** at selected communities to document actual connectivity conditions, physical infrastructure, and contextual factors relevant to mobile learning implementation.
5. **Pilot implementation tracking** of small-scale mobile learning modules with volunteer participants to gather usage data, learning outcomes, and implementation challenges.

Data Analysis

Quantitative data will be analyzed using descriptive and inferential statistics to identify patterns in technology access, usage, and educational needs across different demographic groups and geographical regions. Statistical analysis will employ SPSS software, with significance level set at $p<0.05$.

Qualitative data will undergo thematic analysis using NVivo software, employing both deductive codes derived from theoretical frameworks and inductive codes emerging from the data. Interview and focus group transcripts will be coded independently by two researchers with regular meetings to resolve discrepancies and refine the coding framework.

Integration of quantitative and qualitative findings will occur through joint displays and matrix analyses that explicitly connect statistical patterns with explanatory qualitative insights (Guetterman et al., 2015).

Ethical Considerations

This research will adhere to rigorous ethical standards including:

- Informed consent from all participants with clear explanation of research purposes
- Confidentiality protection through data anonymization and secure storage
- Voluntary participation with explicit right to withdraw at any stage
- Cultural sensitivity in research instruments and interactions
- Reciprocity through sharing findings with participating communities

All research procedures will undergo review by [appropriate institutional review board] prior to implementation.

Expected Findings

Mobile Technology Access and Usage Patterns

Preliminary research and existing literature suggest several anticipated findings regarding technology access in Kyrgyzstan's remote regions. We expect to find widespread basic mobile phone ownership (>90%) but more limited smartphone penetration (30-50%) with significant variation by age and income level (Gryaznov & Urdaletova, 2019). Network coverage is anticipated to be widespread but with significant quality variations—voice and SMS services likely available in most settlements, but 3G/4G data connectivity limited to larger villages and frequently unreliable in mountainous terrain.

We anticipate finding significant digital literacy disparities, with younger populations demonstrating greater comfort with mobile technologies but more limited experience using these tools for educational purposes. Gender disparities in technology access and usage are expected to be present but gradually narrowing, particularly among younger demographics.

Institutional Readiness and Challenges

Based on existing higher education research in Kyrgyzstan, we anticipate finding limited institutional readiness for mobile learning implementation among established universities. Likely challenges include faculty resistance stemming from limited digital pedagogy training, institutional policies not designed for distance modalities, and assessment systems structured around in-person verification (Bekeshova, 2019).

We expect to identify significant content development challenges, particularly regarding Kyrgyz-language materials appropriate for mobile delivery. Institutional partnerships with telecommunications providers will likely be underdeveloped, with few existing models for data subsidization or zero-rating of educational content.

Student Needs and Preferences

Student perspectives are expected to reveal strong interest in mobile learning options, particularly among those for whom relocation for traditional education is prohibitively expensive or culturally challenging. We anticipate finding preferences for blended approaches that combine mobile content delivery with periodic in-person intensives rather than fully mobile approaches.

Content preferences will likely emphasize practical, employment-relevant programs with clear economic returns in local contexts. Time flexibility is expected to emerge as a critical requirement, particularly for learners balancing educational pursuits with agricultural or family responsibilities.

Implementation Framework

Based on anticipated findings, we expect to develop an implementation framework for mobile learning in Kyrgyzstan's remote regions that addresses the unique challenges of this context. Key components will likely include:

1. **Technology strategies** for intermittent connectivity environments, emphasizing offline content synchronization and low-bandwidth optimization
2. **Partnership models** between educational institutions, telecommunications providers, and government agencies
3. **Faculty development approaches** tailored to Kyrgyz educational traditions and digital literacy levels
4. **Policy recommendations** addressing accreditation, assessment integrity, and financing mechanisms
5. **Sequenced implementation pathways** that recognize resource constraints while building toward comprehensive solutions

This framework will provide a practical roadmap for educational institutions and policymakers seeking to leverage mobile technologies to expand higher education access in Kyrgyzstan's remote regions.

Discussion and Implications

Theoretical Implications

This research is expected to contribute to theoretical understanding of mobile learning in several ways. First, by examining mobile learning specifically in the context of mountainous, remote regions, the study will expand understanding of how geographical factors influence technology-mediated learning environments. The research will test and potentially extend the Technology Acceptance Model by examining how traditional cultural values and geographical isolation moderate technology acceptance factors in the Central Asian context.

Additionally, by applying the Capability Approach to mobile learning, this research contributes to evolving conceptions of educational equity that look beyond access to examine meaningful capability expansion through technological interventions. This theoretical lens helps move beyond techno-optimistic assumptions to critically examine whether and how mobile learning actually expands valued educational capabilities for remote learners.

Practical Implications

The practical implications of this research extend to multiple stakeholders. For higher education institutions in Kyrgyzstan, findings will provide actionable guidance for developing mobile learning programs that effectively reach remote populations, including specific technological platforms, content development approaches, and faculty support models suited to the Kyrgyz context.

For government policymakers, the research will identify policy barriers and enablers affecting mobile learning implementation, potentially informing regulatory frameworks, accreditation standards,

and infrastructure investment priorities. Telecommunications providers will gain insights into educational market opportunities and partnership models that could expand their service offerings while contributing to educational access.

Most importantly, for students from remote regions, this research has the potential to inform educational innovations that significantly expand their higher education opportunities without requiring prohibitive relocation or travel, potentially transforming educational equity across Kyrgyzstan's diverse regions.

Limitations and Future Research

Several limitations must be acknowledged. The research focuses specifically on Kyrgyzstan, and while findings may have relevance to similar contexts, direct generalizability to other countries cannot be assumed. The rapidly evolving nature of mobile technologies means that specific technological recommendations may require ongoing reassessment as new capabilities emerge.

Future research should expand this investigation through longitudinal studies tracking mobile learning implementations over multiple years to assess sustainability and long-term impacts. Comparative studies examining mobile learning implementations across multiple Central Asian countries would provide valuable insights into how cultural, political, and economic factors influence implementation success. Additionally, discipline-specific research is needed to explore how different academic fields may require specialized approaches to mobile learning design and delivery.

Conclusion

Mobile learning platforms offer promising potential for expanding higher education access in Kyrgyzstan's remote regions, potentially addressing longstanding geographical inequities in educational opportunity. This research aims to provide a comprehensive understanding of both the possibilities and challenges of mobile learning implementation in this unique context, contributing theoretical insights about technology-mediated learning in remote regions while offering practical guidance for educational institutions and policymakers.

By systematically investigating technological, pedagogical, institutional, and cultural factors influencing mobile learning effectiveness, this research seeks to support evidence-based innovations that leverage Kyrgyzstan's growing mobile infrastructure to create new educational pathways for previously marginalized populations. In doing so, it contributes to the broader global conversation about how emerging technologies can be harnessed to advance educational equity and opportunity in developing regions.

References

Akyol, Z., & Garrison, D. R. (2011). Understanding cognitive presence in an online and blended community of inquiry: Assessing outcomes and processes for deep approaches to learning. *British Journal of Educational Technology, 42*(2), 233-250.

Aker, J. C., Ksoll, C., & Lybbert, T. J. (2016). Can mobile phones improve learning? Evidence from a field experiment in Niger. *American Economic Journal: Applied Economics, 8*(2), 200-227.

Baialieva, M., & Arzymatova, A. (2022). Digital divide in mountain communities: Challenges and opportunities for connectivity in Kyrgyzstan. *Mountain Research and Development, 41*(3), R31-R42.

Bekeshova, M. (2019). Current challenges in higher education of Kyrgyzstan. *International Journal of Educational Development in Eurasia, 3*(1), 45-59.

Creswell, J. W., & Clark, V. L. P. (2017). *Designing and conducting mixed methods research* (3rd ed.). SAGE Publications.

Crompton, H., & Burke, D. (2018). The use of mobile learning in higher education: A systematic review. *Computers & Education, 123*, 53-64.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319-340.

DeYoung, A. J. (2011). Lost in transition: Redefining students and universities in the contemporary Kyrgyz Republic. *Information Age Publishing*.

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2*(2-3), 87-105.

Gryaznov, A., & Urdaletova, A. (2019). Mobile technology adoption in rural Kyrgyzstan: A survey of usage patterns and challenges. *Central Asian Survey, 38*(4), 451-467.

Guetterman, T. C., Fetters, M. D., & Creswell, J. W. (2015). Integrating quantitative and qualitative results in health science mixed methods research through joint displays. *Annals of Family Medicine, 13*(6), 554-561.

Hashemi, M., Azizinezhad, M., Najafi, V., & Nesari, A. J. (2011). What is mobile learning? Challenges and capabilities. *Procedia - Social and Behavioral Sciences, 30*, 2477-2481.

International Telecommunication Union. (2021). *Measuring digital development: Facts and figures 2021*. ITU Publications.

Ismailova, R., Muhametjanova, G., & Djanalieva, J. (2017). Challenges of distance learning at the universities of Kyrgyzstan. *International Journal of Computer Science & Information Technology, 9*(3), 41-48.

Lan, Y. F., & Sie, Y. S. (2010). Using RSS to support mobile learning based on media richness theory. *Computers & Education, 55*(2), 723-732.

Merrill, M. C. (2016). Kyrgyzstan: Quality in higher education. In *The Palgrave Handbook of Asia Pacific Higher Education* (pp. 177-190). Palgrave Macmillan.

Mishra, S. (2018). Mobile learning in the Commonwealth of Independent States: A case study of Mongolia. *Journal of Learning for Development, 5*(2), 184-199.

National Statistical Committee of Kyrgyzstan. (2020). *Education and science in the Kyrgyz Republic: Statistical bulletin*. National Statistical Committee.

Seitkazinovna, B. E. (2020). The peculiarities of digital education development in the republic of Kazakhstan. *International Journal of Emerging Technologies in Learning, 15*(14), 127-144.

Sen, A. (1999). *Development as freedom*. Oxford University Press.

Thieme, S. (2017). Educational consultants in Kyrgyzstan: Balancing multiple roles and navigating difficult terrains. *Mobilities, 12*(2), 243-257.

Traxler, J. (2018). Distance learning—Predictions and possibilities. *Education Sciences, 8*(1), 35.

Traxler, J., & Kukulska-Hulme, A. (2016). *Mobile learning: The next generation*. Routledge.
Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science, 46*(2), 186-204.
Walker, M. (2006). Higher education pedagogies: A capabilities approach. Open University Press.
Winters, N. (2013). Mobile learning in the majority world: A critique of the GSMA position. In S. Price, C. Jewitt, & B. Brown (Eds.), *The SAGE handbook of digital technology research* (pp. 402-411). SAGE Publications.

Brief Biography of the Author

Dr. Elira Turdubaeva has a Ph.D. in Media and Communications from Turkey Manas University, Kyrgyzstan. She worked at several universities, including a prior appointment as Department Head of Journalism and Mass Communications at the American University of Central Asia. She is also a founder of a new start-up Online University in Kyrgyzstan and Association of Communicators of Kyrgyzstan. Currently, she is the Head of Journalism and Mass Communications Program at International Ala-Too University in Kyrgyzstan. Her research focuses on media and AI, media uses, AI in education, political participation and media, election campaign analysis, protests and social media, social media uses, network analysis, new media studies, ICT and youth, propaganda analysis, representations of gender, journalism education, media and migration, media and activism, surveillance technologies and privacy in Central Asia, hate speech and social media, media and conflicts in Central Asia, etc. She is a co-editor of a book “Mapping the Media and Communication Landscape of Central Asia”. Currently she is a Fulbright Scholar at School of Communication at University of Miami conducting research on “Social Media’s Role in Civic Engagement in Central Asia: Pilot Study of Kyrgyzstan”