

**EMERGING TECHNOLOGIES IN BUSINESS EDUCATION AND
ENTREPRENEURSHIP: HARNESSING IMMERSIVE LEARNING FOR
ENTREPRENEURIAL MINDSETS.**

¹Edenkwo, Chidinma. (Ph.D.) & ²Nwaoburu, Blessing. (Ph.D.)

chidinma.edenkwo@ust.edu.ng, nwaeraidols@gmail.com

**¹Department of Corporate Entrepreneurship, Rivers State University, Nkpolu
Oroworukwo, Port Harcourt, Nigeria, ²Department of Business Education,
Federal University Otuoke, Bayelsa State, Nigeria**

ABSTRACT

Disciplines like engineering, medicine, biological sciences, sciences, physiotherapy and lately education are among disciplines where emerging technologies have become prominent and beneficial to students. Emerging technologies in business education and entrepreneurship are innovative thoughts of science which includes technologies in education, information technology, nanotechnology, biotechnology, robotics and artificial intelligence amongst others, with characteristics such as radical, novelty, coherence, prominent impact, relatively fast growth uncertainty and ambiguity. For entrepreneurial mindsets, business education and entrepreneurship students adopt the use of immersive learning (virtual reality, augmented reality, mixed reality and simulations) since it is a catalyst for the understanding and retention of complex concepts. The paper however made the following recommendations amongst others, that university management should network or synergise with the National Universities Commission (NUC) and the TET-Fund to equip business education and entrepreneurship faculties or departments with the latest information communication technologies (ICT) in order to develop entrepreneurial mindsets and lecturers in business education and entrepreneurship should be retrained in terms of workshop on the imperative of mixed reality in the 21st century.

Keywords: Emerging technologies, Immersive learning, Business Education, Entrepreneurs and Entrepreneurial Mindsets.

INTRODUCTION

Modern technology is bringing innovation in the ways man does things and goes about his daily occupations including teaching and learning at various levels of education. In fact, the numbers of users of modern technologies for storing, accessing, analyzing and sending information in training and education have increased. Business education and entrepreneurship are not exempted as information and communication technologies are being used to typify most of what happens in the business environment for entrepreneurial mindsets and in the classroom because graduates of business education and entrepreneurship need to be provided with requisite skills and knowledge to face the world of business. It is surprising to find various forms of electronic devices/gadgets in classrooms for use to train learners. This is not unconnected to why, there is hardly any field and faculty in the education system that does not have one information technology device or the other to be adopted. Thus, technology is seen to be pervasive in the educational field such that engineering and technical parts of learning contents which before now could not be easily seen and observed for instructional purpose but are now accessible, viewed or observed from the classroom position.

Zholaushievna et al (2022) emphasized that, with the existence of modern technology, and online learning, students fully immerse themselves in the educational environment as they watch/listen to lectures, complete assignment, consult with teachers and communicate with classmates. These are pointers that, the importance and significance of technology especially in higher education should not be taken with kids gloves as it is a catalyst for growth, achievements, innovations and entrepreneurial mindsets and thinking. Thus, various innovations and technologies in their early stages have the propensity to metamorphose and alter other various facets of the industries including education and entrepreneurship is christened emerging technologies. They include all forms of progressing technology such as; Artificial intelligence, 3D printing and nanotechnology, robotics amongst others. Learners are becoming well disposed to the use of computer systems, games, virtual workshops and collaborative laboratories, information studies, web, virtual reality, augment reality and other forms of interactive devices to enhance learning. Most of what is encountered during Students' Industrial Work Experience (SIWES) can be reached through the availability of emerging technologies that can immerse their time and attention. Business education as a field of study leading to the acquisition, development and inculcation of the proper values and skills necessary for the efficiency of the economic system calls for employing the state of the art technology (Okoli & Azih, 2015).

The foregoing presentation gives credence to Wool [2022] who aver that, entrepreneurial mindsets are sets of skills that enable individuals to effectively see new opportunities where others only see risks. This implies that, business education and entrepreneurship students that have garnered requisite skills, abilities, competencies and proficiencies as a result of immersive learning tend to develop entrepreneurial mindsets and positive thinking in order to be creative and innovative even in the place of risks. The availability of emerging technologies make it urgent and it aligns with the fast reeling out of ICT tools that business education and entrepreneurship prepare graduates with the knowledge, skills and perspectives for various national, regional, and international undertakings. Instruction in business education and entrepreneurship as a wide area of study in modern time require more of creativity and imagination which visual technology offers to make both the teachers and learners' reason as researchers in attempt to uncover what has been covered/unknown about various business activities in order to develop entrepreneurial mindsets. In the light of this, more technologies are still upcoming to making teaching and learning enriching and at the same time, maximally engage learners, thereby engendering contiguous learning which allows students to be highly hypothetical, creative and imaginative in their thinking. (Regents Centre for Early Development Education, 2024). This is suggestive of the fact that, since business education and entrepreneurship stresses the need for students to effectively and efficiently think outside the box by being creative and innovative, immersive learning does not invalidate the enthusiasm for the development of entrepreneurial mindsets in the 21st century.

Therefore, this paper is an attempt to x-ray the emerging technologies in business education and entrepreneurship and how they can harness immersive learning for entrepreneurial mindsets.

The Concept of Entrepreneurship and Entrepreneurial Minds

The concept of entrepreneurship seems to have a plethora of meanings and definitions right from the days of Richard Cantillon who existed in the 18th century and was regarded as the father of entrepreneurship and the first to ever discuss the concept. Interestingly,

the concept of entrepreneurship in this paper cannot be discussed without a succinct distinction between "Entrepreneurs and Entrepreneurship". Therefore, an entrepreneur is that individual that is ready and capable to take risks with the lucid reason to make profits on every sphere of business activity.

Little wonder, Ottih (2000) Odulami (2001), Osuala (2004), Amesi (2021) and Anukam (2021) encapsulated entrepreneurs to be people with requisite abilities to recognize positive opportunities and in the same vain assemble necessary resources to materialize profits. This position from these scholars implies that, entrepreneurs must have brilliant ideas to be able to innovate, then find the money to translate their ideas into tangible goods and services to satisfy the public [consumers]. Hence, the need for emerging technologies in business education and entrepreneurship as it harnesses immersive learning for students to garner entrepreneurial attributes and thinking.

On the other hand, entrepreneurship is the reason behind self-employment and index to control and manage one's business. It is the ability to set up a business enterprise as different from being self-employed with requisite skills, ideas and managerial abilities necessary for self-reliance. (David & Agbeze as cited in Amesi, 2015). In the views of the present position, the entrepreneur is a visioner and a risk taker who recognizes positive opportunities where others do not and sees the need to translate and transform such with necessary resources into finished products to maximize profits in their business environments. Consequently, it is no doubt that, through the teachings of business education and entrepreneurship in higher institutions via emerging technologies, entrepreneurial mindsets are created. This state of affairs corroborates the view of Anukam (2021) that, individuals may develop a mindset for entrepreneurship ventures without having worked for anyone. Entrepreneurial mindset in the views of Rauch et al (2009), encompasses a set of cognitive, emotional and behavioral attributes that equips individuals to think and act like entrepreneurs having creativity, resilience, persistence, adoptability and a strong sense of self-efficacy traits. Therefore, entrepreneurial mindsets refers to positive thinking hinged on novelty, opportunities and apt challenges that focuses on ground breaking ideas for value creation and impactful living with the skills to navigate and adapt to uncertainties. This is because the foregoing stems from the fact that, in recent times, wages and salary employment cannot solve all the problems an individual encounters daily. Therefore upon graduation, individuals (students from all disciplines) must develop the right entrepreneurial mindsets to be able to navigate and translate their visions into reality through emerging technologies and immersive learning activities.

Emerging Technologies in Modern Times

Emerging technologies are more concerned with science based on innovation, leading to creation of a new industry or transforming the existing one. It hinges on the fact that the world of science is continually evolving. In the concept of emerging technology, the term emerging does not necessarily mean brand new methods, devices or machines. Technology in this context includes the process or product concerned with aids and tools to perfect the mind, which further extends the limited reach of humanity. Technology in itself has been an age long pre-occupation of scientists to ease human activities (Siemens & Tittenberger, 2009). Consequently, emerging technologies are thought of as a science based on innovation, (Day et al in Montoro et al, 2019).

Against heated debates on the concept of emerging technologies, the underlying fact is that, grounds are being broken and new frontiers emerging even among fields of study. Montoro et al (2019) and the Philippine commission on Higher Education (2023) defined emerging technologies as those new technologies that are being continuously developed or will be developed during the next five or ten years. Based on research evidence the concept of emerging technologies draws its meaning from the recent past as technology has been an academic jargon in the science, still extending its frontier and application to the near unimaginable future; touching many fields and spheres of human lives. In the view of Stahl (2011), emerging technologies include those technologies that will become relevant in the upcoming ten to fifteen years. The main limit of consideration in defining emerging technologies is the timeline and permeating influences of existing and new technologies. However, there are technologies that may be seen as emerging in different rights but do not hold any present and prospective innovation in various fields of human activities; they may not be considered as emerging technologies.

Researchers in information technology domain tend to favour the consideration that emerging technologies are innovations of existing technologies which are used creatively for modernity. Porter in Montoro et al (2019) agreed that the impact of the emerging technologies has been enormous and tremendous in education, economy and society; and hold greater relevance in many industries in the 21st century when viewed from its time of emergence (high demand for human welfare during population explosion), sustainability, innovative nature and continuous evolution. For example, the artificial intelligence first developed in the 1950s, is still considered as an emerging technology because it is still progressing and is embedded in various research areas.

The Philippine Commission on Higher Education (2024) outlined five characteristics of emerging technologies in an attempt to clear divergent views emanating from the conceptual debates. These characteristics are:

1. **Radical Novelty:** As a progressing technology, novelty or newness in terms of putting existing technologies to a new use. The application of artificial intelligence to different uses to achieve different result can be cited.
2. **Relatively Fast Growth:** In comparison to other technologies without prospect of future innovations touching very limited uses, emerging technology grows at a fast rate and in a number of dimensions. For example, its ability to replicate prototype, other product, ssservice, knowledge, and so on. Thus, artificial intelligence is also another case in points.
3. **Coherence:** For a technology to be considered emerging technology, it draws or converges other technologies that were, abinitio, separated in order to meet man's specific need. There is a logical interconnectivity of scientific findings and separated technologies, thus making it to persist. For example, cloud, artificial intelligence, data analytics and robotics are grouped to achieve different uses.
4. **Prominent Impact:** Emerging technology provides benefits for a wide range of sectors, transforms an industry and exerts much enhanced economic influence. It impacts across domains and potentially the entire socio-economic system.
5. **Uncertainty and Ambiguity:** The process of any emerging technology is full of uncertainty and ambiguity arising from its fast growth and wide acceptance. Their proposed uses are still not understood as possible outcomes remain uncertain which may be unintended and undesirable. For example, there are various applications or

uses of artificial intelligence that some people can predict, but these applications may or may not be successfully developed.

Areas of Emerging Technologies

There is no gain saying that emerging technologies are making monitoring, evaluation, research and learning more precise and providing enriching data for different national, regional and international socio-economic systems. It has substantially altered and still altering the business and social environment. With the debate of what could be classified as emerging technology, technology professional has identified areas and building blocks of different industries that have shown the coherence of certain previous technologies. Emerging technologies embrace a variety of technology according to O'Reilly Media-Technology (2002) and the Philippine Commission on Higher Education (2024); these include educational technology, information technology, nanotechnology, biotechnology, robotics, artificial intelligence, mixed-reality, quantum computers among other. These technologies are indeed the combinations of physics, mathematics and computer sciences and the impacts of their products, processes and practices are quite pervasive in many industries as they basically provide information services for these industries' operations. These areas of applications of emerging technologies are still evolving with the hope of meeting man's specific social and economic needs. In other words, they fulfill a given function by using basic principles as compared to what the previous technology used to achieve similar purpose. Some of these technological areas imparted by emerging technologies earlier mentioned are outlined below;

1. **Educational technology:** Apart from the fact that education remains the bedrock of every modern society, educational technology seems to have evolved and transformed from the antique methods of teaching and learning to digital technologies, hinged on the innovative and creative methods approaches to education. Ed Tech [Educational Technology] is the application of principles, laws, and recent discoveries of science and technology to the process of and education. Beeland (2003), Picciano (2017), Dunleavy et al [2013] are all in consonance that, educational technologies include interactive Whiteboards and Online Learning Management Systems [Moodle, Canvas, Google Classroom], Virtual reality simulations, Artificial intelligence and Educational tips amongst others. These are pointers that, in this digital age, the forgoing technologies in education have the propensity to nurture and prepare the future of students for entrepreneurial thinking or mindsets by exploring trends and innovations towards unlocking possibilities, growth and entrepreneurial opportunities.
2. **Information Technology:** Information technology is very significant and important in every formal organisation by transforming the ways work is expedited and how to communicate effectively. Thus it is the application of technology to the management of information from storage, retrieval, processing and transformation of data and information technology includes the following: Hardware (computers, laptops, desktops, tablets); Servers (Cloud, database, file); Networking devices (router, switches firewalls); Software operating systems (Windows, MacOs, Linux); Database management systems (MySQL, Orade); Networking-Internet (TOP/IP, HTTP); Cybersecurity-Firewalls (Network security, Cisco, 2020); Encryption (data

- protection) (AES, 2020); Antivirus Software (Malware protection, Norton, 2020). (Cloudivize, 2024, Kumar, 2020, Rouse, 2019 & Cisco Press 2020).
3. **Nanotechnology:** This is the design and fabrication of materials, devices and system with control at nanoscale (very small size) dimensions. Therefore, the importance of nanotechnology especially in engineering has been applauded. In the thoughts of Hossain and Rameeja (2015), nanotechnology enhances and improves work quality in terms of building; it improves fire-resistance, corrosion protection, insulation; improves the quality and availability of water.
 4. **Biotechnology:** In the views of Britannica (2024), biotechnology involves the harnessing and the application of living organisms and their components to solve problems and create products for humans. For instance, the production of drugs via genetic engineering. Kumar and Singh (2020) aver that, biotechnology has made it possible for the development of novel drugs, medication, vaccines and diagnostic tools for the treatment and amelioration of diseases.
 5. **Robotics:** This is the design, construction, operation and use of robotics which are suitable for real life application in automated manufacturing and non-manufacturing industries. Robotics can be used in manufacturing, assembling, painting, packaging, surgeries, agriculture (planting, harvesting) amongst others. (Sicilliano & Khatib, 2016).
 6. **Artificial Intelligence:** This is the development of intelligent computer systems capable of perceiving, analyzing and reacting according to the inputs. Hence, artificial intelligence according to Russel and Norving (2016) are grouped into 2 – Narrow AI and General AI. The Narrow AI is used for facial recognition and language translation while the General is stronger than the Narrow AI and expedites functions just like humans.
 7. **Mixed-Reality:** This is the amalgam (combination) of the real world and virtual stimuli. It is done in an immersive and interactive environment where learners (students) can have a feel of the real world/time environment for efficiency, effectiveness and greater performances. The features of mixed reality in the view of Milgram and Koshino (1994) includes spatial mapping, object and gesture recognition, and the interaction between physical and logical objects in real time.
 8. **Quantum Computers:** This is the use of the quantum laws to solve problem too complex for classical computers. It can also be applied to different areas such as the discovery of drugs/medications, material science, cryptography and so on. Quantum computers seem to encounter some challenges over time. This must be why Nielsen and Chuang (2010) agree that, maintaining qubit coherence and the minimization of errors as a result of noise and decoherence are some of the challenges in quantum computing/computers.

Utilizing Educational Technology and Mixed Reality in Business Education and Entrepreneurship for Entrepreneurial Mindsets

Education, simply perceived as teaching and learning is an information transfer process whether voiced or pictorial. It involves different media, methods, strategies and techniques of reaching the learner from the source. The process of using voice or picture for instructional purpose falls under the domain of educational technology. It is also the application of principles, laws, recent discoveries of science and technology to the process

of education. In the views of Barbara and Richey in the University of Hawaii System (2024), educational technology is concerned with the theory and practice of design, development, utilization, management and evaluation of processes and resources for learning. It implies that with available technological devices whether electronics, mechanical, as well as resources standardized, customized or improvised, educational technologists including teachers at various levels should be committed to searching for new and effective ways of organizing the teaching and learning process.

Education (teaching and learning) falls into four activities namely dissemination, discussion, discovery and demonstration (Siemens & Tittenberger, 2009). Education as a process of imparting knowledge, skills and values is currently experiencing intrusion from the information technology field making it a subject of interest by educationists, researchers and industries that seek to improve the means of knowledge transfer and make learning process a fun. It is a requirement in the field of education that teachers of different categories show concern in the best possible application of technology and technological development including tools and devices to educational practices (University of Hawaii System, 2024). Such technological tools and consideration are the use of projected moving pictures, computer generated contents, and augmented materials to enrich and immerse learning in the classroom and home study.

Business education and entrepreneurship are also expected to benefit from the wind and plethora of technology in education. Rizov and Rizova (2015) averred that it is possible for augmented reality, which interlinks real-world by capturing computer generated text, images, video and animation in various disciplines, such as medicine, education and architecture to be used in education. The nature of the society and the learning environment where greater population needs various forms of general and specialized education calls for a combination of teaching techniques and strategies that prepare learners for the society in return to think entrepreneurially. The idea of mixed reality and blended learning is therefore gaining prominence; and focusing making the classroom a mini-workshop or transferring the workshop from its location to learners' convenient places. Mixed reality is the blending of virtual reality and augmented reality technologies resulting in a spectrum that combines real-world elements with virtual objects or environment (Mohd et al, 2023). It is the amalgam of the real world with the virtual stimuli. On the other hand, blended learning is defined as a teaching and learning approach that combines face to face classroom method with computer (technology) mediated activities to deliver instruction (University Grants Commission, New Delhi, 2024). It combines traditional face to face learning with technology. This implies that, apart from enhancing educational outputs and performances, it however equips and exposes students in the usage of these technologies to establish entrepreneurial ventures.

The main concern of mixed reality is augmented reality and virtual reality and the difference between them lies on the extent real images are employed in their use for instructional purpose. Business education is such a field in education that prepare its learners for practical and real life experience of business, vocational and professional ideologies all geared towards entrepreneurship. Introducing the mixed reality technology is not out of place because this method typifies what exactly goes on in the society. Atakpa (2000) viewed business education as a programme concerned with the vocational and professional preparation for a career in business. Kaliraj and Devi (2022) asserted that, technology in term of use of augmented reality involves projecting 3 dimension model or insert, fuse and

overlay digital information in the real world environment. The virtual reality technology only uses computers to create and generate a stimulated environment.

Virtual reality technology are likened to computer animation and videos, a sort of artificial world or environment which educators use; however when they are supplemented with sounds and graphic, the technology becomes augmented reality method both of which represent mixed reality technology in education. The use of cartoons, display of human real picture/image to interpret a computerized table of values, with human voice, animated video of transactions discussed by human voice, tone and intonation used to bring home business concepts as students watch display of sales data or promotion explained by a natural man's voice and demonstration of typing skill which combines videos of real human hand (fingers) and artificial computer created key board are examples of mixed reality in business education. While virtual reality in classroom is absorbing to the learners, augmented reality can make them feel at home because of the addition of familiar realities in life. Consequently, Zholaushievna et al (2022) emphasized that augmented reality is a combination of two initially independent spaces on the screen-the world of real objects around a person; and the virtual world created by a computer.

Augmented reality technology implies a combined technology which overlays virtual reality and is been used in other climes in engineering, biological sciences and sciences, real estate, medical, fashion design, physiotherapy; but evidence abound that it can also be employed in business classes (Uzoechina et al, 2021). Lee (2012) outlined some of the futures of augmented realities in education such as;

1. **Interactive Education:** It is capable of creating more engaging, productive, enriching and pleasurable educational environment especially with the computer generated, three-dimensional environment and modes.
2. **Simplicity:** It makes providing learning and training experience to business educators easy through the simulation generated by computers, and other electronic devices capable of fusing both realities.
3. **Contextual Information:** It can improve the extent and quality of information by making learning and training environment more educational, productive and contextual.
4. **Efficiency and Effectiveness:** It allows business educators and learners in higher institution and secondary pre-vocational/vocational level to take greater control of their own learning through providing more authentic learning and training styles.

Immersive Learning in Business Education and Entrepreneurship for Entrepreneurial Mindsets

Immersive learning as a concept, seems to have been taught and used in other disciplines. Lately in education, immersive learning has become a topical and interesting issue. This is not unconnected to the fact that, it is a transformative approach especially in education involving the creation of highly engaging and interactive experiences for students (individuals) through the use of immersive technologies like Virtual Reality (VR), Augmented Reality (AR), Mixed Reality [MR] and simulations to enhance their understanding and retention of complex concepts. [Dalgarno & Lee, 2010). This therefore implies that, technology is pivotal in every aspect of human activity or interaction in recent times.

It is not a surprise that the information technologists present this era as the digital age marking about the onset of the third industrial revolution, because of the prolific use of

technology in almost all aspects of human activity including digital interaction. Although this era began in the 1970s, there were students, called the digital native comprising of those born between 1980 and 1994, believed to represent the first generation to grow up with new technology and have been characterized by their familiarity with and confidence in the use of information and communication technology (Creighton, 2018). Greater percentage of this population born at that time also represent secondary and tertiary school students in educational institutions as Gallard – Echenique et al (2015) pointed out, that these students have spent most of their lives surrounded with digital communication technology. These students described as digital natives are also referred to as “born digital” and digital learners which assume a wider inclusive range; are known for easy adoption of digital device. They get along and fully absorbed and immersed in both education and non-education activities that involves the digital communication technology. These technologies are as well described as immersive technologies thus encouraging immersive learning. Therefore immersive learning occurs where students are provided the ability to access multimedia educational content and other digital educational resources (computers and internet) and interactive experiences (Londono, 2023). Fermandes (2023) further averred that immersive learning is different, and potentially more powerful than real world learning (physical training experience), as it allows students to create interaction and activities in a designed experience that is not possible to occur in real world during the period of training. By implication of the forgoing analysis, students (individuals) are being spurred or ignited to develop entrepreneurial mindsets as a result of immersive learning (mixed reality, virtual reality and augmented reality).

The adoption of mixed reality comprising the virtual reality and the augmented reality in the teaching and learning of business education and entrepreneurship is an immersive teaching and learning technology (Ntaba & Jantijies, 2019; Fermandes, 2023). Furthermore, Memon (2007) opined that, immersive learning significantly leverage mobile devices, augmented reality, virtual reality and other advanced digital technologies that support communication, collaboration, simulation, and modeling. Business education and entrepreneurship as a field of study in the higher institution covers theoretical, practical, general education and general business education and entrepreneurship components (Umo & Okon, 2023), for teacher trainees, student teachers, managers and professional business men and women. Involving technology in the programme is inevitable because of the present digital era since it is capable of generating and simulating learning experiences and interactions that are not possible to arise during student industrial work experience in the areas of accounting, office and information technology, managements, marketing, innovation development and creation of new products and ventures among others. With the aid of mixed reality and the immersive technology, students’ interest are motivated, attention is captivated, detail study of activities/objects are encouraged and as well as active participation of every student in the class for entrepreneurial developments or mindsets.

CONCLUSION

Indeed technology has permeated different areas of human life resulting from the fact that man has always sought to make problem-solving as easy as possible. Thus, technology has continued to meet other proximate human needs in different industries but not necessarily as brand new methods, devices or principles. It is on this note that emerging technologies

in business education and entrepreneurship tend to harness entrepreneurial mindsets, thinking and development via immersive learning.

Suggestions

The following suggestions were made:

1. The university managements should Network/Synergize with National Universities Commission (NUC and TET-Fund to equip the faculties of Business Education as well as Entrepreneurship faculties with the latest Information and Communication Technology (ICT) gadgets in the universities in order to develop entrepreneurial mindsets.
2. Lecturers in business education and entrepreneurship should be retrained in terms of workshop on the imperative of the mixed reality technology in the 21st century.
3. Acquisition of personal information technology gadgets (laptops) should be made a prerequisite for admission into business education and entrepreneurship departments for achievable entrepreneurial mindsets

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