

LEVERAGING THE POWER OF VIRTUAL REALITY CLASSROOMS FOR THE DEVELOPMENT OF ENTREPRENEURIAL SKILLS IN UNDERGRADUATE STUDENTS

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Abstract

An Entrepreneur is seen as an individual who uses his creative idea to develop a profitable business. Entrepreneurship plays a major role in both personal and economic growth, especially as the present generation migrates from the fourth industrial revolution to knowledge base economy. In Nigeria, the introduction of entrepreneurship education came as a result of the high level of unemployment and poverty. This is because entrepreneurship education enables individuals with the required skills and knowledge to develop innovative business ideas. However, starting a new business has its risk and challenges. This challenge could be minimized with the help of virtual reality classroom. Virtual reality classroom presents an environment where individuals could perform laboratory practical's, medical surgery and negotiate business ideas with no risk involved. Students acquire necessary skills helping them to tackle everyday challenges on their entrepreneurial pathways. Virtual reality allows products to be tested virtually before physical prototypes are created, which can lead to better designs and improved usability. Virtual reality has been adopted in fields such as: military simulation, aerospace, medical practical sections, architectural design, Sport, industrial manufacturing management, movies and video games to mention a few. In this article, the authors discussed Entrepreneurship Education, Virtual reality and Virtual reality classroom in teaching entrepreneurial skills.

Keywords: Virtual Classroom, Virtual reality, Virtual Reality Classroom, Entrepreneurship, Undergraduate Students

An entrepreneur is an individual that sees an opportunity, and takes risk's to make ends meet. According to Moataaz (2019), economy with a higher level of entrepreneurs shows greater productivity and output. This is because entrepreneurship may reduce the level of unemployment and contributes higher earnings to better national income in form of higher tax revenue. Before the mid 80s, unemployment and poverty were less of a national concern as it is presently (Ogundele and Egunjimi, 2016). However, the need for entrepreneurship started in Nigeria due to high level of corruption, political instability, and social economic policies of successive government which resulted in the emergence of high level of unemployment. To salvage this situation, entrepreneurship education was introduced to provide students with meaningful education which could make them self-reliant and self-dependent. Entrepreneurship education is the process of training individuals to understand and develop key entrepreneurial skills and attributes. Entrepreneurial skills such as creativity, innovative, critical thinking and risk taking are relevant to those who have interest in starting and growing their own business. However, starting a new business venture involves a lot of risks for a fresh graduate. These risks include: fear of the business environment, loss of time, resources and money. Virtual reality classroom offers students the environment to run a business in a virtual world and experience the gain and challenges of being an entrepreneur without any risk involved. Virtual reality (VR) technology refers to a three dimensional (3D) reality utilizing a sequence of input sensors and output sensors, by which a combination of actions can be transformed into the computer to get 3D visual, auditory, tactical and other sense perception (Xisong, 2016). Virtual reality has been adopted in fields such as: military simulation, aerospace, medical practical sections, architectural design, Sport, industrial manufacturing management, movies and video games to mention a few.

Virtual reality seems to be the natural next step for the evolution of education. This is because in this 21st century, books are being turned into eBooks. Hence it is paramount to adopt virtual reality into the classroom. According to Nick (2019) Virtual reality classroom (VRC) helps to enhance student learning and engagement, it allows students not only see what they learn but also interact with it. Students can interact with a learning environment, and create their own three dimensional worlds. Virtual reality could aid in the teaching of entrepreneurship skills to undergraduate students. In this virtual classroom, students can communicate, collaborate, and conduct business in a simulated environment. Exploring these VRC opportunities could also provide fertile testing ground for real world entrepreneurs who wish to try out their ideas in the relatively low risk environment of VRC (Andrew, Jennifer, Anjala and Darren, 2013). However, how can this virtual reality classroom aid in the developing entrepreneurial skills in undergraduate students?

Justification for the study

In the Nigeria education system, entrepreneurship which is a compulsory subject at the tertiary level is often times taught theoretically without students having hands-on experience. This in turn does not equip students to solve the challenges of being an entrepreneur in real life situation. Virtual reality classroom (VRC) offers students the opportunity to have hands-on experience on the hurdles and benefits of being an entrepreneur in our modern society.

Aim

The aim of this study is to Leverage on the power of virtual reality classrooms for the development of entrepreneurial skills in undergraduate students. This aim will be discussed under the following subheading:

1. Entrepreneurship Education
2. Virtual reality
3. Virtual reality classroom- What it is, and how it works
4. Virtual reality in teaching entrepreneurial skills

Entrepreneurship Education

Entrepreneurship has various definitions by different authors. The concept is seen as the dynamic procedure of creating wealth by persons who assume the risks involved in providing worth for some products or services. Josephine and Doris (2019) stated that Entrepreneurship is thus the ability and the willingness of an individual to seek and make use of investment opportunities. It is actually involved with creating opportunities and meeting the requirements of individuals and a process of identifying the discrepancy in one's immediate community and society at large while bringing together innovative conduct to fill these gaps. It is a continuous procedure of creating wealth through the discovery of opportunities and the employment of personal skills and assets. Entrepreneurship education according to Ogundele and Egunjimi (2016) is structured to accomplish the following objectives:

1. Offer purposeful education for the unemployed youth that will enable them to be self-employed, and self-sufficient.
2. Offer graduates with sufficient training that will allow them to be creative and innovative in discovering new business opportunities.
3. Serve as a medium for economic growth and development.
4. Offer higher institution graduates with adequate lessons in risk management, and to make certain bearing feasible and reduce the high level of poverty.
5. Decrease in rural-urban migration.
6. Present young graduates with adequate training and support that will allow them to create a career in small and medium sized business.
7. Encourage the spirit of determination in the youths and adults which will allow them to continue in any business enterprise they embark on.
8. Generate smooth transition from conventional to a modern industrial economy

Entrepreneurship education is the systematic process of providing learners the necessary skills and knowledge to promote their vision and attitude. According to Ogundele and Egunjimi (2016) over the years research has shown that tertiary education has not rightly included the philosophy of self-reliance such as creating a new cultural and productive surroundings that will encourage pride in primitive work and self-discipline, encouraging youth to take part actively and liberally in discussions and decisions affecting their general wellbeing, promoting new sets of attributes and culture for their realization of future challenges. Nevertheless, Entrepreneurial education is focused on developing youths as well as persons with passion and numerous skills (Olufemi 2018). It focused on reducing the risks connected with entrepreneurship thought and guides the enterprise effectively through its initial stage to the maturity stage. Entrepreneurship education is intended to communicate and instill competencies, skills and values needed to identify business prospect, manage and start new business venture. It is mostly centered on promoting, inspiring children, youths and elders on the path of self independence both in thinking and creativity in business. Entrepreneurship education is gaining thrust among tertiary institutions in Nigeria, with increasing importance either as a single subject or as a program of study. Though the labour market continues to present employment opportunities to fresh graduates, entrepreneurship can be a more rewarding and satisfying career for many graduates particularly with the many new venture privileges and support provided by various government agencies. However, entrepreneurship is even more important when supply of jobs in the labour market shrinks. Knowledge about entrepreneurship will be very valuable when fresh graduates are unable to find their dream jobs or retrenched when the economy slows down.

Virtual Reality

New technologies cover different breeds of technology such as: Virtual Reality (VR), Augmented Reality (AR), Gamification, mobile learning applications and other online platforms, among others (Concordia, 2019). According to virtual reality society (2017), **Virtual Reality VR** comes naturally from definitions of both virtual and reality. Virtual simply mean near and reality is what human beings experience. Hence, the word virtual reality basically means near-reality. This may perhaps, mean something but it generally refers to a specific type of reality emulation. Virtual reality is used to illustrate a three dimensional (3D) computer generated surrounding which could be explored and interacted with by an individual and the person becomes part of this virtual environment or is engrossed within this world. This virtual world is accessed with the aid of virtual reality headset, this headset does not just change traditional lessons into an immersive learning background, and it also enables student access worlds never before possible. In 3D, images appear life-sized to the person, and they change position as the person moves around their environment which corresponds with the change in their field of visualization. Over the years, virtual reality has been adopted in medical surgeries in trainee surgeons, graphic simulation, aerospace, architectural plan/design, Sport, industrial manufacturing organization, movies and computer games, entertainment industry to mention a few. Virtual reality allows us to take virtual risks in order to

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acquire real world experience. According to Dimiter and Plamena (2017) some variety of technologies are used to create this real experiences, they include:

1. Stereoscopic Display. Also known as 3D display or head mounted displays (HMDs). These displays use a mixture of multiple images, realistic optical distortion, and special lenses to produce a stereo image that our eyes deduce as having three-dimensional (3D) depth.
2. Movement Tracking Hardware. Gyroscopes, accelerometers and other low-cost apparatus are used in virtual reality hardware to sense when our bodies move and our heads turn, so that the application can bring up to date our view into the three dimensional scene.
3. Input Devices. Virtual reality is used in creating new types of input devices outside the keyboard and mouse, as well as game controllers and hand- and body-tracking sensors that can identify motion and demonstrations.
4. Desktop and other Mobile Platforms. This involves computer hardware, operating systems, software to interface to the devices, frameworks and engines that run applications, and software tools for creating them.

Without all the four components mentioned above, it is difficult to achieve a fully immersive virtual reality experience. Thus, we can conclude that in general virtual reality is the computer-generated simulation of a three dimensional surroundings, which seems very real to the person experiencing it and using special electronic apparatus. One major feature of virtual reality is interactivity. The virtual reality gives users the privilege to socialize, study human nature and other user's ability (Fomsi and Eke, 2019).

Virtual Reality Classroom – What it is, and how it works

Virtual reality classroom or environment can engage students in particular situations which simulate real-world conditions. In this classroom, all learners are represented as avatars and have the ability to move within the virtual classroom in a similar manner to the real world. According to Fomsi and Eke (2019), avatars in virtual classroom are icons, objects or character which an online user adopts to represent himself. The utilization of avatars provides participants with a sense of awareness and presence and can improve communication and collaboration among the students and the tutor too. This presence is in general experienced by the sense of space that the virtual environment formulates and also the ability that the avatar has to move and to interact with constructions and contact with others in the virtual environment (Grivokostopoulou, 2019). In the virtual world environment, several educational facilities can be created to support students learning. Students can participate in a virtual classroom and attend lectures, take part in individual and group learning activities and also carry out exercises and assessments.



Figure 1. Use of virtual gadgets in the classroom
Source: John (2017). Augmented and mixed reality in education

In the figure above, a virtual classroom of the 3D virtual reality is illustrated. Students and teachers can visit virtual classrooms, virtual laboratories, and virtual libraries and study the educational materials of the courses as well as participate in learning activities, take exercises and quizzes. For example, Gurkan, Mehmet and Serkan (2018) examined the general opinion of undergraduate student's opinion about the use of virtual reality glasses in history education and to examine their suggestions in this subject. Case study method was adopted for the study. Sampling was created by selecting 25 undergraduate students according to set objective of the study. Data was collected with interview method and analyzed with content analysis technique. From the study result, it was concluded that virtual reality implementation were liked by participants. Furthermore, participants stated that the use of the present technology in course activities would be valuable. Grivokostopoulou (2019) examined the Impact of a Gamified Entrepreneurship Education Framework in Higher Education, a total of 86 students participated in the study, 52% male and 48% female. The 3D virtual reality educational environment utilizes educational infrastructure and pedagogical approaches that are based on gamification principles, which allows students to study in immersive ways as well as in game-based learning activities on real challenges that can be found in business environments. Result of the study shows that gamified learning activities that engage students in realistic situations which require students to put theoretical knowledge into practice have a greater impact on student learning with regard to entrepreneurship concepts and also their comprehension and learning experience. Also virtual reality environment helps students gain necessary skills, helping them to tackle everyday obstacles on their entrepreneurial pathways. Virtual reality effectively engage learners, Madathil, Frady, Hartley, Bertrand, Alfred, and Gramopadhye (2017) conducted a study to investigated the extent to which virtual reality (VR) based education improves learning performance and students perceived engagement with technical curriculum. A total of 165 technical college students were randomly selected and were grouped into three namely: a VR simulation that tasked the user with identifying potential safety hazards in a manufacturing environment, a photo based case

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study where users identified and categorized hazards from images of a manufacturing plant, and a control group. Findings indicated that virtual reality has the potential to improve students' learning experience by actively engaging them. Ozgur (2015) also investigated effects of live virtual classroom on learner's achievement and to find out students' opinions about the virtual physics classroom at distance learning. A total of 63 second year distance computer education and instructional technology learners took part in this study. Results show that the learners were generally positively affected by the live virtual physics classroom at distance education. Joschka and Thomas (2017) explored the impacts of virtual reality on business models, using an example of the media industry. Media industry is one of the industry that is been affected by virtual reality. The study differentiate between the internal use of VR applications in companies (e.g., for seminars and collaborating) and the production and distribution of VR content for external use (e.g., videos and computer games). The findings demonstrate that the impact of VR on companies that produce and issue VR contents for external purposes is large and even increases when more technologies are required to create content and when the content is more interactive. Mustafa, Mustafa and Ebru (2018) examined attitudes of secondary school students towards augmented reality (AR) applications. The study adopted a common survey model, the study group comprised of 547 graders. Findings from the study show that students have positive attitudes towards augmented applications. Gender, ownership of personal computers and mobile devices were not found to alter attitudes toward augmented applications. While every day internet use was not found to affect augmented attitudes, it was found that behavior varied considerably according to frequency of playing computer games. Research findings also revealed a meaningful connection between AR behaviour and achievement. Virtual reality classroom (VRC) blends virtual animation and virtual space to externalize abstract concepts, to create highly open, interactive, immersive 3D learning environment (Xisong, 2016). The overall integration solution of VRC classroom consists of hardware terminals, educational software, and educational resources. Based on educational resources, teachers can regulate students' VR devices to learn educational resources via PC terminal and VRC educational software. For instance, VRC could be used to teach specific subjects such as:

1. Mathematics: Virtual reality classroom can fully assemble students' visual, auditory and other sensory participation to visualize complex abstract mathematics concepts, particularly for spatial geometry conversion, calculus transformation, mapping tab, 3D coordinate space, percentage calculation and geometric items.
2. Biology: with the aid virtual reality classroom, students can view cells, viruses, organs, and other macro organism in their biological environment.
3. Physics: Virtual reality technique can display energy, motion and force, physical, thermal, optical, atomic, mechanical, electrical and abstract physical problems on virtual reality classroom, and provides a true visual learning stage to help students understand and master all kinds of practical physics laws, by accessible virtual experiments and exploratory operation.

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4. Chemistry: with the help of panoramic virtual reality classroom, chemistry experiments procedure can be achieved in the absence of important equipment and reagents, the virtual system can be repetitive disregarding the loss of experimental equipment and experimental safety, to provide more metaphorical material for teachers, greatly increasing the students' interest and initiative.
5. Astronomy: Today, the study of the sun, earth and the other planets can be thought with the aid of virtual reality. Students can feel and touch an image of Mars and Saturn, and also manufacture the red planet where they could walk on and look around it.

Virtual reality classroom has been used in different field of education as stated above and could be leveraged in the field of entrepreneurship education.

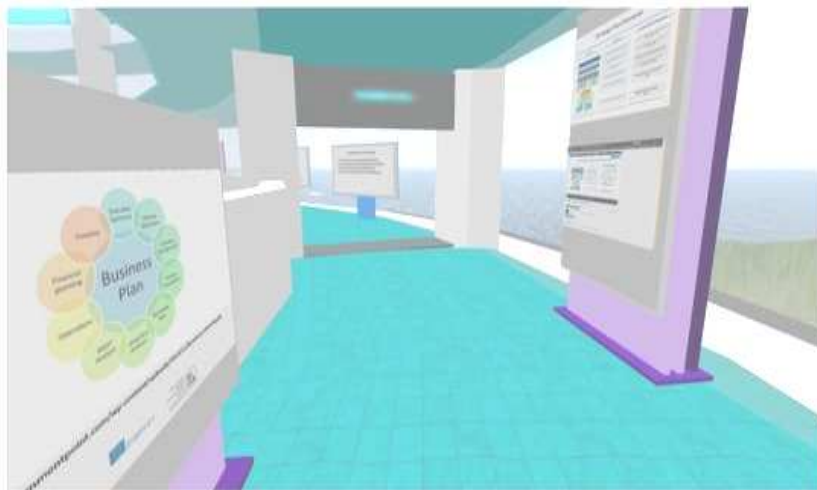


Figure 3. Presentations in the virtual reality classroom about the formulation of business plans.

Source: Grivokostopoulou, F. (2019) Impact of a Gamified Entrepreneurship Education. Two theories serve as a basis for this study. These are Bruner's Constructivism theory and Siemens' theory of connectivism.

Constructivism is a theory postulated by Bruner in 1986. It is called an active process of learning, where students construct new ideas or innovation based on past acquired knowledge. Constructivism theory is relevant to this study because it relies on construction of new ideas. These ideas could be a new business plan or investment. This theory is based on that students learn better when they gain knowledge through exploration and active learning. Constructivism theory enables teachers encourage students to be critical thinkers, collaborate and predict information. According to Augsburg University (2020) listed some of the guiding principles of constructivism, this include:

1. Students should be engaged in hands-on learning.

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2. Teachers should encourage student's views and perspective
3. Encourage learners discover and challenge their assumptions.

Connectivism is a theory developed by Siemens in 2005. It is called the learning theory for the digital age. It is a theory that integrates social learning with digital technologies. This theory is very important for this study because connectivism relies on sharing (connection) and collaborative tools provide a platform for such sharing. These technologies enhance connections between people and ideas. One of the principles of connectivism is that capacity to learn is more critical than what is currently known (Siemens, 2004 cited in Chen and Bryer, 2013). The central theme of connectivism is that knowledge is formed by creating connections between various nodes in a network. The idea of networks is derived from computer networks where a node usually refers to computers, cables, hubs and other accessories that are interconnected to form a local area network.

Figure 2. Virtual reality in astronomy class

Source: Jyoti (2019). Virtual reality in education: how schools are opting the advance retaining and learning techniques.



Figure 3. virtual reality in a medical classroom

Source: Jean-Louise(2019). Apple AR/VR: Reality Bites Virtual Reality



Figure 4: virtual reality in engineering classroom
Sources: techgyd.com

Virtual reality in teaching of entrepreneurship skills

Virtual Reality is an innovative and a cutting-edge form of technology which has crossed the barriers to go through into different areas in life. One of the fields which can take an evolutionary advantage of Virtual reality (VR) is entrepreneurship education owing to the great interactivity level that VR allows the users to experiment abstract concepts. According to Marko (2019), entrepreneurship education forms a top priority in policy agendas across the globe as a means to encourage economic growth, eradicate unemployment and create social capital. An essential premise of entrepreneurship education is that it can be learned and students can be taught to invent entrepreneurial mentality, skills and competencies, something that can result in the formulation of startups and business proposals. Given the significance of entrepreneurship, the necessity to formulate effective entrepreneurship education frameworks and training programs occur. Training with virtual reality would form a good foundation for entrepreneurship education. It will enable students to learn how to negotiate or trade with virtual money to buy, sell, and hold seminars or classes with no risk involved. It thus permits students to create and test products virtually before physical prototypes are produced, which can lead to better designs and improved usability. Various topics in entrepreneurship education could be designed and formulated to present students the privilege to acquire practical knowledge of entrepreneurship. The three dimensional virtual reality educational environments utilizes pedagogical methods that are centered on gamification ideology, allowing students to study in immersive ways as well as in game based learning activities on real challenges that can be found in business world. The game based learning actions can assist students gain essential skills, helping them to undertake everyday obstacles on their entrepreneurial endeavors. In particular, virtual reality can lead to improve student engagement, provide active learning, constructivist learning, enhance frequency of authentic learning experiences, allow for compassionate experiences, enable students to exercise creativity, and provide a ground for visualizing abstract concepts accurately.

Adoption of virtual reality classrooms for the teaching of entrepreneurial skills is very imperative given the fact that entrepreneurship education is necessary for sustainable national development. Entrepreneurship is increasingly being acknowledged as an important channel for bringing about a revolution to sustainable products and services and the execution of projects addressing diverse social and environment concerns (Sabrine and Anis, 2018). According to Abolaji and Obatunde (2019)), the responsibility of entrepreneurship in a developing society is presented as follows:

1. Employment creation: Unemployment is a major dilemma facing all nations of the world and solving this setback that has become prevalent is the quest of all nations. Entrepreneurship has remained the most significant tool for solving them. Those, who take to entrepreneurship instantaneously, thrive in providing jobs for themselves, as well as others.
2. Improvement of technological adaptation: privileges for developing and adapting suitable technological methods are provided by entrepreneurs. This facilitates the inclusion of all kinds of workers - skilled, semi-skilled and unskilled persons.
3. Improvement in resource use: In various nations, resources could be left fallow but entrepreneurs put together these resources, which might otherwise remain inactive, and put them into useful and profitable use. They add to the mobilization of household savings and utilization of local resources including human resources.
4. Stimulation of development in the sectors which supply it with inputs: in general, entrepreneurship is a means for the stimulation of development in the market. The better the number of small-scale entrepreneurs that survive in the downside of a particular sector, the better the market, and by expansion, the greater the capacity utilization.
5. Fortification of large-scale enterprises and general enterprises: Entrepreneurs principally generate raw equipment in the form of semi-processed goods for the use of better enterprises. This is obviously depicted by the synergized connection existing between them and large-scale enterprises, in terms of supply of inputs and support in the allocation of the finished goods to the final consumers.
6. Support and sustenance of economic dynamism that helps an economy to adjust successfully in a swiftly changing global economy: owing to their personality, small-scale entrepreneurial ventures are frequently flexible and able of responding rapidly to global economic changes. Entrepreneurial ventures have, however accounted for a great percentage of all businesses and a positive percentage of Gross National Product of many countries.
7. It promotes effective and efficient utilization of individuals' potentials and energies: Entrepreneurship is making individuals to utilize their potentials and energies to generate wealth, independence and position in the society.

Most flourishing businesses in Nigeria today began small. As a result of opportunity to display potentiality and freedom, some entrepreneurs are capable to work on their ventures and grow them to become bigger businesses that bring them fulfillment for the development and ability to produce jobs for others. Moreover, sustainability

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growth is needed to improve small, medium and large scale businesses for constant satisfaction of both today and tomorrow. Aja, Onoh and Igwe (2018) stated that sustainable growth is the management and preservation of natural resources base and orientation of technology and institutional change in such a manner as to guarantee the attainment and continued fulfillment of human needs for present and future generation.

Conclusions

Today, Virtual reality has been applied in various domains such as training simulation, medical and health care, education, scientific visualization, and entertainment industry. Virtual reality classroom (VRC) has also been adopted in education in teaching and learning such as mathematics, biology, geography, chemistry, economics, history, computer science to mention a few. VRC enables users to learn and develop their skills through the help of computer simulated environment that can simulate physical presence in places in the world, as well as in imaginary worlds. This effective and efficient learning environment is highly desirable in order to properly teach and instill entrepreneurial skills to undergraduate students.

Suggestions

1. Teachers need to be trained through support programs to boost their knowledge and understanding of virtual reality classroom and its use, and affordance.
2. School administrators should provide necessary digital tools for effective implementation of the use of virtual reality classroom in teaching and learning.
3. Curriculum planners should plan the curriculum such that virtual reality classroom will be ideally integrated into topics to be learnt by the students, this will aid the achievement of its objectives.

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