

ISSN 12449-1314



OSUN SOCIOLOGICAL REVIEW

Vol.3, No.1, January 2016

**Published by the
DEPARTMENT OF SOCIOLOGY
OSUN STATE UNIVERSITY, OSOGBO
(Okuku Campus)**

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VOLUME 3 NO. 1, JANUARY, 2016

**PUBLISHED BY THE
DEPARTMENT OF SOCIOLOGY,
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OSUN SOCIOLOGICAL REVIEW

VOLUME 3, NO. 1, JANUARY, 2016

LIST OF ARTICLES	PAGE
1. INTEGRATING NIGERIAN YOUTH INTO THE DEVELOPMENT PROCESS- Gadzama, Ishaku Usman & Mohammed Usman	1-12
2. CREATIVITY IN TEACHING: THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) - Bello, Muhinat Bolanle; Daramola, Dorcas Shola; & Amali, Ismaila Oteikwu Onche	13-22
3. GLOBALIZATION AND SUSTAINABLE DEVELOPMENT IN NIGERIA: CHALLENGES AND PROSPECTS- God'stime Osariyekemwen Igiebor	23-32
4. SOCIAL FACTORS AS PREDICTORS OF VIOLENCE AGAINST CHILDREN IN BENIN CITY, NIGERIA - Omorogiuwa, Tracy Beauty Evbayiro	33-42
5. POLITICS AND PROBITY OF PROBES IN NIGERIA: A CASE OF THE NATIONAL ASSEMBLY IN THE FOURTH REPUBLIC - Abutudu Musa & Osumah Oarhe	43-56
6. THE RULE OF LAW AND IMPEACHMENT IN NIGERIA'S FOURTH REPUBLIC- Idachaba Enemaku, Olaniyi Oladele & Akinlotan Raymond	57-68
7. BOKO HARAM TERRORISM IN NIGERIA: DYNAMICS, DIMENSIONS AND CONSEQUENCES -Muhammad Kabir Isa	69-82
8. ENVIRONMENTAL OIL-RELATED CONFLICTS IN THE NIGER DELTA REGION OF NIGERIA, 1990-2010- Abejide, Taiye Samuel; Raji, Adesina O. Yusuf & Grundlingh L.	83-98
9. SOCIOLOGICAL IMPLICATIONS OF MEDIA COVERAGE OF THE LEADERSHIP CRISIS IN THE 8 TH NATIONAL ASSEMBLY - Wonuola, Monsurat Modasola; Olagunju, Faosat Biola & Yusuf Noah	99-112
10. TOWARDS NIGERIA'S 20:2020: REVISITING THE DEBATES ON DECENTRALIZED DEVELOPMENTAL STRATEGY- Basiru, Adeniyi Semiu & Ogunwa, Samuel Adetola	113-126
11. INFANT MORTALITY AND ACCESS TO PRIMARY HEALTH CARE IN BWARI AREA COUNCIL, FCT, ABUJA, NIGERIA - Aliyu, Bello Mohammed & Yewodo, Nathaniel Jonah	127-136
12. ELECTORAL VIOLENCE IN NIGERIA AND ITS IMPLICATIONS FOR NATIONAL SECURITY – Raji Shittu	137-152

13. YOUTH BULGE AND THE POTENTIAL FOR DEVELOPMENT IN AFRICA- Ajayi, Olugbemiga Oluwaseun 153-160
14. SOCIO-ECONOMIC CONSEQUENCES OF GLOBAL CLIMATE CHANGE: A REVIEW ON NIGERIAN EVIDENCE- Ibrahim, Muhammad Adam & Mustapha, Hussein Danjuma 161-168
15. SOCIAL MEDIA AND CITIZENS' POWER IN AFRICA: NIGERIA IN A THRESHOLD OF THIRD LIBERATION? – Ottoh, O. Ferdinand 169-178
16. THE CHANGING PATTERNS OF GOVERNMENT INVOLVEMENT IN INDUSTRIAL RELATIONS- THE NIGERIAN CASE- Okaka, Emmanuel Obukovwo & Osekwe Jesica 179-186
17. DISPUTE RESOLUTION MECHANISMS AND THE CHALLENGES OF HARMONIOUS INDUSTRIAL RELATIONS IN NIGERIA - Olatunji Abdulganiy; Issah Moshood; & Lawal, Ebenezer Ejalonibu 187-198

CREATIVITY IN TEACHING: THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

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Abstract

Nations of the world today invest heavily on human capital development through qualitative and well planned educational system to achieve success and prosperity of individuals and that of the world at large. To this end this paper examined how Information and Communication Technology support creativity in teaching, as this would break barriers in learners becoming adaptable to a range of situations become independent in their learning and thinking skills. This paper discussed the concept and theory of creativity, benefits of creative teaching, how teachers can promote creativity in the classroom, barriers to been creative, the concept of Information and Communication Technology (ICT) and how it promotes creativity. The paper recommended for the inclusion of ICT in school curricular and the provision of ICT equipments for learners.

Keywords: Creativity; Development; Education; Information and Communication Technology (ICT)

Introduction

In the past few years, the world has witnessed a phenomenal growth in communication technology, computer network and information technology. Development of new broadband communication services and convergence of telecommunication with computers have created numerous possibilities to use a variety of new technology tools for teaching and learning system. The integration of computers and communications offers unprecedented opportunities to the education systems with its capacity to integrate, enhance and interact with each other over a wide geographic distance in a meaningful way to achieve the learning objectives. The growth of these communication and computer systems, their ease of use, the power and diversity of information transfer allow teachers and students to have access to a world beyond the classroom. It has the potential to transform the nature and process of the learning environment and envision a new learning culture. Interactivity, flexibility and convenience have become the order of the day in the ICT supported environment. ICT opens up opportunities for learning because it enables learners to access, extend, transform and share ideas and information in multi-modal communication styles and format. It helps the learner to share learning resources and spaces, promote learner centered and collaborative learning principles and enhance critical thinking, creative thinking and problem solving skills. This is an indication that ICT if properly enhance by the teacher, would be a veritable tool of promoting creativity in students

Conceptual and Theoretical Frameworks

Creativity and innovation are broad, complex and multi-faceted concepts that can be applied to several fields. Their multi-disciplinarity account for a variety of approaches and conceptualizations. It is therefore necessary to consider existing research on creativity and innovation in order to address some of the misconceptions about the concepts that are based on common connotations in an attempt to avoid any possible bias.

Despite the plethora of approaches, there seems to be a widespread consensus on the definition of both creativity and innovation, even if their application and interpretation differ. Creativity has been understood as the ability to produce work that is both novel and appropriate (Sternberg & Lubart, 1999). Innovation is seen as the implementation of a new or significantly improved product (goods or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations. (OECD, 2005). Craft (2005) describes creativity as the ability to see possibilities that others have not noticed, Esquivel (1995) describes it as the critical process involved in the generation of new ideas. Innovation has also been defined as the intentional introduction and application within a job, work team, or organization of ideas, processes, products, or procedures that are new to that job, work team or organization and that are designed to benefit the job, work team or organization (West & Richards, 1999). Craft (2005) describes innovation as the implementation of new ideas to create something of value, proven through its uptake in market place. An innovation can be seen as a new idea being launched on the market for the first time. The Oxford English Dictionary definition's of *creative* mentions the relationship between the uses of imagination or original ideas in order to create something new (2006). This definition holds truth however it is important to realise that being creative does not always need an end result. The playfulness of the learning process is just as important.

Creativity has been defined in a number of different contexts. Boden (2001; p 95) believes that creativity is 'the ability to come up with new ideas that are surprising yet intelligible, and also valuable in some ways.' Ausubel (1963) defined creativity as 'a rare and unique talent in a particular field of endeavour', whilst Bruner (1965) offered a less elitist definition when he suggested that creativity results in 'an act that produces effective surprise'.

The notion of surprise is useful when one considers the differential between divergent and convergent thinking (Guilford, 1986). Solutions to problems that are merely 'reproductive' and unimaginative are labelled convergent. Conversely, new and novel solutions using lateral thinking and productivity that lie outside conventional thought are said to be divergent (Turner, 1977; p. 55).

Creativity and innovation are obviously inter-related. Creativity is seen as the infinite source of innovation (EC, 2008), deducing from the above definitions, innovation can in turn be perceived as the application and implementation of creativity. Different fields seem to favour one concept above the other, for instance in business the word "innovation" is used even when it refers to creative process and work (Sternberg & Lubart, 1999). The concept of creativity has been used in several contexts by researchers and non-specialists alike. This extended use of the term has shaped a strong connotative value, creativity is often perceived as synonymous for imagination and originality, and is

allegedly connected to the visual arts, music and artistic performance. If one is to build on these assumptions, the implication for education would be reductionist: creativity would be seen as the domain of the arts only and therefore restricted to certain specific subjects. Although recognizing the relevance of the visual arts, music, drama and the likes for a creative education, it should not be forgotten that all areas of knowledge and all school subjects can benefit from creativity.

Today, we are less in awe of the creative process. Now, creativity is recognised as a practical skill, one which can be taught and which everyone can achieve. It is a way of thinking in which we look at familiar things with a fresh eye, examine a problem with an open mind about how it might be solved, and use our imagination rather than our knowledge to explore new possibilities rather than established approaches.

The Concept of Information and Communication Technology (ICT)

ICT (information and communications technology - or technologies) is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning. ICTs are often spoken of in a particular context, such as ICTs in education, health care, or libraries.

ICT is technology that supports activities involving information. Such activities include gathering, processing, storing and presenting data. Increasingly these activities also involve collaboration and communication. Hence IT has become ICT: information and communication technology.

Some underlying principles: Technology does not exist in isolation

- ICT contributes at various points along a line of activity
- ICT is used in activities – the ICT use depends on the activities
- The key outputs of educational activities are context, knowledge, experience and products
- The output should be useful to the users (self and others).

In summary Information and communications technology (ICT) refers to all the technology used to handle telecommunications, broadcast media, intelligent building management systems, audiovisual processing and transmission systems, and network-based control and monitoring functions. Although ICT is often considered an extended synonym for information technology (IT), its scope is more broad. ICT has more recently been used to describe the convergence of several technologies and the use of common transmission lines carrying very diverse data and communication types and formats.

The Importance of Creativity

Creativity is clearly important on a national and global level for economic growth and development. But there is an increasing recognition that it is key at an individual level also. Creativity improves the self-esteem, motivation and achievement of learners. Pupils who are encouraged to think creatively:

- become more interested in discovering things for themselves;
- are more open to new ideas and challenges;

Creativity in Teaching: The Role of Information and Communication Technology (ICT)

- are more able to solve problems;
- can work well with others;
- become more effective learners;
- have greater ownership over their learning.

Approaches to Creativity

Looking into existing research, it is evident that creativity is a complex issue and difficult to describe. Several fields tackle creativity with their own methods and arrive, as noted before, at different conclusions. All the approaches entail a specific conceptualization and understanding of the concept. An attempt is made to review the major approaches to creativity and creative teaching some of which are psychometric approach, psychoanalytic approach, self-expression and mystical approach, end-product approach and cognitive approach (embracing phase-oriented studies, pragmatic methods and thinking theory).

Psychometric Approach: Creativity is seen under this approach as a quality that is possessed by everyone and can be measured. Thus, it is just a characteristic of inventors or eminent individuals such as Einstein or Michelangelo (Guilford, 1950). This idea was taken further by Torrance, who developed the Torrance Test of Creativity Thinking (Torrance, 1974). His written test evaluates divergent thinking and problem-solving according to statistical rarity of answers. The approach has been heavily criticized (Almeida, Prieto, Ferrando, Oliveira, & Ferrandiz, 2008) as it failed to capture and determine what creativity is and how it is expressed.

Psychoanalytic Approach: This approach sees creativity as the manifestation of the unconscious for artistic purposes. Its theoretical background lies in the work of Freud and in the tension between conscious and unconscious processes. It is possible to find all the theories that connect pre-conscious or unconscious thinking with the 'creative sparkle' (Eigen, 1983), including the research that relates the creative 'eureka' moment to day-dreaming, pre-dreaming, drugs and mental illnesses (Heilman, Nadeau, & Beversdorf, 2003). This approach has influenced the common and scientific vocabulary regarding creativity.

Self-expression and mystical approach: This approach sees creativity as the need to express oneself in a unique way. The emphasis is on aesthetic and expressive outcomes. It is based on common assumptions, implicit theories and connotations, rather than on scientific research (Runco, 1999). The concept of creativity has often been mingled with associations to talent and inspiration. In ancient time the creative person was seen as directly inspired by the divine (Sternber & Lubart, 1999). This mystical approach has been mainly applied to the visual arts, music and writing and can be found in the invocation to the Muses or to God in many literary texts. It is related to the artistic domain and to the idea that creativity cannot be studied (Sternberg & Lubart, 1999). Such a view of creativity gives more emphasis to originality than value, sometimes intertwining creativity with drug use or with mental illnesses (Beghetto, 2005). This approach has an important spill-over effect in education. As Sharp (2004) remarked, most parents (or teachers), when talking about children's creativity, think about artistic or musical talent. This diminishes the role and relevance of creativity in other domains and areas of knowledge and also the concept of creativity as a skill that can be learnt.

End-product approach: Here, creativity is seen as a process that results in a product, work or output. Creative experience is thought of as opposite reproductive experience (Taylor, 1988). While several researchers will not consider this approach as their main understanding of creativity, the assumption that creativity is manifested in an output lies behind many theories and is a taken-for-granted factor. This understanding of creativity is evident in design, visual art and music, in the “creative industries”, where the manufactured goods are perceived as the result of a creative process. The idea permeates the literature, as it is evident in many contributions to two reference books on creativity, namely *Theories of creativity* and *Handbook of creativity*, where the authors tend to identify creativity with creations (Albert & Runco, 1990; Sternberg, 1999). It has also been acknowledged that not all artistic products are creative (Taylor, 1988).

Cognitive approach: This approach sees creativity as a cognitive and thinking skill or process. It seeks to understand the thinking process of creative thought (Sternberg & Lubart, 1999). It is possibly the most prominent researched area in creativity debate, and it includes several schools of thought: phase-oriented studies, pragmatic methods and thinking theories. These perspectives have fast overlaps, as they all see creativity as a process and as a mental representation.

Several scientific contributions ranging from the studies on personality to environmental variables of creativity are cluster under the umbrella of thinking theory. Many focus on the study of genius, trying to establish what personal characteristics made these people become successful scientists, artists, inventors or creators. Others link creativity with the idea of intelligence (Albert & Runco, 1990), or with personal characteristics such as persuasion (Simonton, 1990). Others focus on environmental factors that influence how creativity is shaped and perceived (Laske, 1993). Others analysed the motivational variables that may trigger or hinder the creative potential (Amabile, 1998). Robinson (2001) and Albert & Runco (1990) gave the example of the scientific revolution as a period of intense creativity, bringing about intellectual paradigm shifts. This comparison certainly suggested that the shaping of creativity is closely related to intellectual development and cultural change. It is assumed that to understand and teach creativity in the school, it is also necessary to possess an understanding of both intellect and culture.

Creativity is about being creative in thoughts and ideas in order to produce something different, this need to go beyond the boundaries set. When implementing creativity into the classrooms it is important to consider the idea of promoting children to think ‘outside of box’. Creativity should break barriers in learning resulting in children becoming adaptable to a range of situations. ‘Creativity is not only desirable but also necessary because it involves co-construction of meaning and promotes an active role of the learner’ (Ferrari, Cachia & Punie, 2009). This is a valid point as it enforces that creative teaching promotes active learning and enables children to create meaning. Creative thinking is one of the most important skills children can acquire and develop whilst in their early years. Creative thinking can be used within a number of learning contexts to enrich the acquisition of knowledge and skills. Thus, teachers can take students through some of the enumerated stages to spur creative thinking in them and certain variables such as environment, personal characteristics, intelligence and motivation should be considered while teaching creative thinking. Crucially, without the

Creativity in Teaching: The Role of Information and Communication Technology (ICT)

ability to think in a creative manner, children would be unimaginative and lacking in the necessary transferable skills to engage in personal and professional life. Creative people have been the focus of a great deal of research.

Creativity is evident in a number of diverse learning contexts. Gardner (1999) for example sees creativity as a cognitive process in which several intelligences such as seeing, thinking and innovating are combined. It is evident from the above that the concept of creativity is a complex one and an area of learning that is in need of more concerted investigation. The recent escalation of ICT provision in Nigerian schools provides even greater impetus for teachers to develop a better understanding of creative thought and action. Teachers will need to justify their use of ICT and will be required to demonstrate the effectiveness of computer supported learning in the form of measurable students attainment.

Benefits of Creative Teaching

The following benefits of creative teaching were highlighted by Bartel (2008)

- i. Encourages children to become independent in their learning and thinking skills.
- ii. Enables children to look past the norm.
- iii. Allows children to further their thinking so they are not 'stuck inside the box'
- iv. Supports child led discovery, with support from the teacher. 'Limitations can be a good thing to motivate creativity'
- v. Gives children attitude to create and try something new.

How Teachers can Promote Creativity in the Classroom

Encouraging creativity in the classroom is primarily the task of the teacher. Harnessing the power of divergent thought and marrying this with the power of ICT will be the aim of many teachers who espouse the use of computers in the classroom.

Creative thinking is achievable by all children, regardless of their academic attainment, providing that conditions are conducive and children have acquired the relevant skills and knowledge. Providing opportunities for all children to succeed is the key to maximising individual strengths and abilities. These opportunities may present themselves through individual study-based tasks or through collaborative group activities where every member's contribution is valued and where peer tutoring offers children the chance to develop their creative thinking as they attempt to explain a solution to a problem to another member of the group.

Creative abilities can be enhanced through practical application, and the use of ICT can enable children to have an immediate 'hands on' facility where they can feel in control of their own learning. The use of multitask settings allow children the option to withdraw from problem solving temporarily in order to pursue other useful activities. Whilst engaged in less cerebral activities, their minds are free to follow creative strands where thoughts and ideas drift in and out of conscious thought as possibilities to be considered and rejected. This teaching style and the use of projects which cross traditional subject areas allows for cross fertilisation of ideas and facilitates the opportunity to make connections and see practical applications.

The skill of teaching to foster creativity has to be a combination of structured and unstructured activities, this is what sociologist of education referred to as official and

hidden curriculum in the school, to enable unconscious as well as conscious thought and where intuitive reasoning is as valued as rational calculation. There is a fine balance between freedom and control.

In all of these, environments as well as motivation are key factors for stimulating creative performance and the notion of self-directed learning is crucial to the development of the independent thinker. Encouraging children to think about their own thinking (metacognition) can enhance the learning process and teaching children to foster creativity encourages a responsibility for learning.

Barriers to being Creative

Here are some common barriers to creativity in teaching learning process as mentioned by Robinson (2013)

- i. Teachers have a busy schedule which can mean that they do not have the time to plan something creative and new. Ferrari, Cachia and Punie (2009) support this, '[...] one of the barriers to creativity is how overloaded teachers' schedules can be'
- ii. Some children may be put off being creative as, in their previous experience, they have found themselves being wrong, or not being happy with the result. This means that teachers need to encourage children at any time they make mistakes. This is because children need to learn from their mistakes.
- iii. Some children cannot accept change.

How Information and Communication Technological Tools that support Creativity in Students

- a. **Blogs for creative thinking:** Blogs are a great way for the development of creative thinking and writing in students. It provides freedom to children to post whatever they want and comment upon or share each other's material. They can openly write on topics that intrigue them and give vent to their ideas without having to worry about grading or grammatical errors. Children can volunteer to organize and manage a common class blog, which will act as a common source of expression for the entire class. Blogging makes children feel responsible for their own learning and they are encouraged to incorporate creativity in their learning through them, which they could not do before. Few free blogging platforms for teachers and children are, *Edublogs*, *Blogger*, *WordPress* and many more.
- b. Use of a range of media (across the curriculum to teach children how to use a range of resources to learn): Teaching children how to use a range of media results in children being able to be given a task with a purpose, and then decide themselves what media they use to complete the task. This enables creative teaching because children gain an understanding of originality.
- c. **Cartoon and Comic Strip Tools:** Children love cartoons and comics. This is visible right from the shine in their eyes whenever teachers introduce such material into their lesson plans, children automatically get engaged more than ever. So, why not introduce children to a set of free and friendly tools to empower them to create *their own comic strips* or cartoon animations. This will give them a chance to let loose their creative powers and delve into the world of creativity without any hindrance. Let them create their own cartoons to conceptualize a topic or a popular

Creativity in Teaching: The Role of Information and Communication Technology (ICT)

figure, in the way they want and let them express what they think about a school event in a comic way. 'Cartoons for the Classroom' is one popular website, which is a great resource of comic strips for children and teachers.

- d. **Mind-Mapping and Brainstorming tools:** Brainstorming on topics that are to be introduced to children as now become a great collaborative way in today's teaching practices, which encourages children to think out of the box and creatively. Brainstorming when done with technology becomes much more easy and engaging. Children can conveniently do it on their own. They can use a set of easy and free tools to make fantastic mind-maps and visual graphs to illustrate a topic or a concept. These tools boost their creativity and provide them with different ways to interconnect their thoughts. Some free mind-mapping tools for children and teachers are SpiderScribe, Wise Mapping, ChartTool, Creately and more.
- e. **Infographics:** Infographics are loved by all, since they represent data in a colorful and catchy way. By using free tools for infographics, children can create awesome graphs, which make the interpretation of information easier and quicker. They can employ their creativity and imagination to create an infographic about a topic, concept or anything they want. They can share these infographics and also embed them into their classroom blog. This thrives and fosters creativity in students. Some free tools for creating infographics are Wordle, Tableau, Inkspace, and more.
- f. Using a tablet/ camera/ flipcam in the classroom (they can be planned into all subjects, ensuring they have a purpose to engage the child to be imaginative): Children can gain a sense of speed of ICT when using this equipment. This contributes to creativity as children will begin to use them to gain a sense of value in their work. The pace of the learning can mean the pace of gaining knowledge is increased resulting in creativity being present.
- g. Using the Interactive Whiteboard (can be used across the curriculum to make lessons more interactive and engaging): The IWB can be used for a range of reasons in the classroom. The main reason is to display to children diagrams, words, the learning intention etc. However it can also be used to show demonstrations. These could be video and sound clips, images and photographs, the internet etc. This promotes creativity as children are using a range of resources in their learning and it is brought to their awareness how technology is fast growing.
- a. **Video and Audio tools:** There are many easy to use video and tutorial creation tools that children and teachers can use in their teaching and learning. Children can create their own videos and share them with their class, which can be a great opportunity for them to develop their creative skills. Audio tools are equally significant; children can create short embeddable audio clips using them. They can even simulate a discussion with others or anything else they want. They can record it and share it with their mates on the class blog or school website. Some video-making tools for children and teachers are Jing, Camstudio, Screencr, etc. Some audio-recording tools are Vocaro, Audio Pal, Record MP3 and more.
- b. **Digital storytelling tools:** Telling a story is a powerful way to communicate with others. It improves the creative skills of children and helps them explore the meaning of their own work and experience. Children can create their own digital

stories with many available free tools, namely, Story Bird , PicLits, Slidestory and more.

- c. **Games:** Games have incessantly proven to be one of the best ways of promoting co-operation and creativity. Educational games keep children engaged with their study, ignite the interactive and imaginative element in their thinking and mould it towards creativity. Now, games have become a must to be included element in education. Some educational games freely available online are Capital Penguin , Grammar Gorillas, FunBrain.com and more.

All of these tools of technology are creativity triggers that help children develop creative thinking and other essential skills. They are easily and freely available and teachers should readily adopt them into their academic curricula, so that their children never lag behind when it comes to creativity, since it is vital for their all-round development.

Conclusion and Recommendations

In conclusion, creative thinking is one of the most important skills children can acquire and develop whilst in their early years. This could be adequately developed with the use of ICT, if the following recommendations could be considered:

1. The use of ICT should be incorporated in topics to be taught in order to enhance learners' creativity and better performance.
2. Infrastructure with computers that have high speed and large storage capacity to help the learners have unlimited access to academic activities related to their programme which would also spur creativity in them should be provided and upgraded in schools.
3. Needed ICT equipments should be provided for the learners' use.

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Creativity in Teaching: The Role of Information and Communication Technology (ICT)

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