INTEGRATION OF TECHNOLOGY INTO CLASSROOM INSTRUCTION: 
IMPACT ON READING COMPREHENSION SKILLS OF UNDERGRADUATES

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Abstract
Reading is a complex interaction between the reader and the text. It requires skills such as the ability to access, evaluate, synthesise and analyse a vast quantity of information. In order to survive and thrive in today’s world, one must be able to comprehend texts read in various disciplines. Understanding different texts is crucial for success in one’s academic work. Without comprehension, reading is a frustrating exercise that does not provide the reader any information. Since reading is indispensable in any formal learning, teachers are expected to help students develop the knowledge, skill and experience they need to become competent and enthusiastic readers. As technology-empowered education is becoming a vital and interesting part of higher learning, it has become absolutely necessary for teachers to enhance the level of digital inclusion in their classrooms. This paper examined how technology-mediated learning facilitates reading comprehension among undergraduates. To achieve this objective, 200 undergraduates from different departments were selected from Federal University of Technology, Owerri through the random sampling technique. The students were taught and examined, using two different methods: Teacher-centered method and Technology-integrated strategy. The subjects’ performances were analysed to determine the effect of the methods. It was discovered that technology-integrated strategy transformed the subjects into enthusiastic readers. The study concludes that integrating technology into language learning develops independent learning and therefore recommends further research on technology-integrated learning.

Keywords: reading, comprehension and technology.

Introduction
Reading is a language skill that enriches the mind and enhances the readers' intellectual acumen, "it is a very active process in which an individual interacts with the voice or voices in a written text" (Muduabuchi& Ogamba, 2011, p.142). The Reading Association of Nigeria (2007) asserts that reading is a kind of language in which an individual makes use of his background experience, attitudes and desires in negotiating, constructing and reconstructing meaning from the written text. Reading is a characteristic feature of every academic work. At every level, learners are required to acquire basic skills of reading in order to excel in their studies.

As undergraduates pursuing various careers, students must be avid and engaged readers. This would help them to acquire all types of knowledge needed for scholarship in the university. An enthusiastic reader increases his knowledge and language proficiency. Krashen (1989) sees reading exposure as the primary means of developing comprehension, writing style, sophisticated vocabulary and reading fluency. Reading will help students and scholars to attain the technological advancement needed in the country. On this premise, Onuakorogu (2003, p.2) asserts that "reading will empower us to learn from the experiences of those nations whose technologies are ahead of us".

Being engaged and efficient readers is fundamental to scholarship and for individuals and national growth. To achieve the needed national development, the reading culture must be entrenched. Students must also read and understand what they read. As Arua (2009, p.3) points out, meaning is at the center of the reading process. It relates to content which itself deals with the knowledge to be acquired during the reading process. Reading with comprehension is crucial since extraction of meaning encoded by the author is what is needed by learners.

For Denhoff (1991), reading is a process which is complete only when comprehension is attained. Readers must read with the aim of understanding what they read to attain success in all spheres of life. Comprehension is the ability to understand and gain meaning from what has been read and being able to communicate this information to others. There is the need to integrate technology into reading in Nigerian institutions of learning because it would enhance students’ academic performances.

Reading Comprehension and Technology
Despite the significant roles reading plays in one’s intellectual attainment, most students do not read at all. One must be able to comprehend what one reads. According to Lucina (2003), one must learn to read to be able to read to learn. The reading...
culture in Nigerian universities has dwindled. Without the knowledge of reading, students remain illiterate. UNESCO (2013) recorded about 774 million global adult population are illiterate in the world. Most students suffer from illiteracy. They lack the desire to read. Alliterate people can read but they tend to avoid the activity. Illiteracy has a negative effect on students because learners who do not read, do not develop the language skills. Eze (2007) asserts that the poor performance in any examination is always a product of poor reading skills and comprehension. When effective reading culture is developed, students become more proficient in their use of language and their performance in other course contents are enhanced.

The essence of incorporating technology into educational process is to improve students’ academic achievement through the use of technology in schools. ‘Technology is a body of knowledge devoted to create tools, process actions, and extract materials or information’ (Stem, 2012, p.68). It is an application of source to solve a problem. Technology not only gives learners the opportunity to control their own learning process, but also provides reader access to an infinite amount of information which the teacher cannot provide (Lawrence, 2012). The extensive courses and chances when the computer and internet offer to language learners have brought about new methods and strategies in learning language skills. In the same vein, Wang (2005) expounds that technology based education enables students to communicate world-wide through the internet search for information on line, use of software to learn skills and evaluate them, publish their work and read in vast disciplines. In addition, Wang (2005) points out that integrating technology in classroom changes learning from behavioural learning approach to constructive learning approach. In other words, technology-intergrated learning personalizes learning.

It has been observed that the 21st century generation has continued to grow with technology and students of this generation are obsessed with technology. More so, the Internet is becoming an increasingly vital tool in our research-oriented society. For instance, Nigerians go on line to conduct day to day activity such as education, business transaction, personal correspondence, research, information gathering and job search. Each year, being digitally connected becomes more critical to economic and educational advancement and community participation. Today, aptitude test in the universities is a computer-based examination. Given that a large number of Nigerians regularly use the Internet and computer peripherals to conduct daily activities, people who lack access to these tools are at a growing disadvantage. As information technology has become a trend in Nigeria, it is imperative to integrate technology use in the learning and teaching of language skills. Given the vital roles of technology today, this paper examines the effectiveness of using computer technology as a tool to support and improve reading comprehension of undergraduates. The study will also compare the effect of the teacher-centered learning and technology-integrated learning methods on students’ rate of comprehension. The attitude of the students towards both methods will also be assessed.

The Problem
Some undergraduates show a lot of apathy towards reading and this is affecting their performance. For instance, when some undergraduates are given reading assignments, they tend to neglect the reading assignment. One of the basic ways of learning is by reading. As Lieron and Kner (1987, p.3) aptly observe, “the ability to read and comprehend is the most important aspect of learning. Technology can assist with these expectations and make learning more successful. Despite the fact that technology has been playing a central role in learning, some teachers still rely heavily on teacher-centered learning method without involving students in the use of technology. This study set out to examine the effect of integrating technology into language learning.

Purpose of the Study
We are living in an age of information where people are filled with the expectation to learn the skills of evaluating, analyzing and synthesizing vast quantities of information. Students are required to meet up with the academic demands. This calls for extensive and intensive reading. There is the need for the integration of technology into learning strategies. Therefore, the objectives of this paper are:

- To determine if technology-integrated learning method is more effective than teacher-centered learning method.
- To ascertain the attitudes of students towards the teacher-centered learning method.
- To access the attitude of students towards technology-integrated learning.
Research Questions
The following research questions guided the study:
- Is technology-integrated learning more effective than teacher-centered learning method?
- What are the attitudes of students towards teacher-centered learning method?
- What are the attitudes of students towards technology-integrated learning?

Scope of Study
There are different types of technology but our focus here is on communication technology. Communication technology is defined in this study as a system that applies technical needs to transmit information from one person to the other. In this study, four major communication technical tools were used. These include phone, computers, e-mail messages and the Internet search. The focus is on reading comprehension of first year science undergraduates.

Theoretical Framework
The Activity Theory originated from Vygotski. He investigated how activity theory can be used to understand the process of transformation that occurs when computers are used as learning tools and how systems interact with each other and transform each other over time. It illustrates how a shift in the object of activity leads to a shift at all levels of the system. Activity theory stipulates that learning is the complex result of tool-mediated interactions rather than as something opaque which happens in students’ minds. Vygotski sees learning as transformation rather than transmission.

Other exponents of Activity Theory, Hashim & Jones (2007, p.3) expound that the Activity Theory is a ‘conceptual framework for the analysis and understanding of human interaction through the use of tools and artifacts’. According to these scholars, Activity theory is a conceptual framework that is based on the idea that doing proceeds thinking and that goals, images, cognitive models, intentions and abstract notions (definition) grow out of people doing things. Activity theory sees the integration of technology as tools which mediate social action. These tools or artifacts include instruments, signs, language, machines and computer.

Scalon and Isoroff (2005) further explores the activity theory in the field of education. Their model examined the current use of learning technologies in higher education. In their model, the learning technology is the tool in higher education, the subject is the student and the object is the purpose of the task and the desired outcome is more learning. This model is illustrated in the diagram below.

Scalon and Isoroff's Model on the use of Technology in Education
This study adopted the Scalon and Issorof activity theory model. The theory is relevant to the study because it involves the use of tools (technology) in learning. The subjects are the students who participate actively in learning while interacting with technology. The task given to them is reading comprehension passage and summary. The passage was sent to their e-mail; the students were also required to browse in the internet on the topic. The activity theory provides a means for observing the transformation in learning through the use of tools. For Gifford and Enyedy (1999) observed that activity theory helps us to build our knowledge and develop our points of view.

Methodology

Population

The subjects for this study were two hundred undergraduates from two different schools in the Federal University of Technology Owerri: School of Science and School of Engineering and Engineering Technology. One hundred subjects were randomly selected from each school. The undergraduates were all in year one where “reading” is taught as a component of the “Use of English”, a course taught to facilitate fluency and proficiency in the English language.

The subjects so selected were divided into two groups. Group one consisted of those who were taught exclusively through Teacher-centered learning (TCL) method. Group Two comprised those who were exposed to both Technology Integrated-learning (TIL) method and Teacher-centered method.

Procedure

The effectiveness and value of the two approaches were evaluated to determine the impact of the two approaches on reading comprehension. To test the students’ level of comprehension, Group 1 were engaged in an hour lecture-section on the topic: ‘Gas Behaviour’. For Group 2, the lecture notes were sent to their e-mail addresses and they were asked to read the notes and browse the topic and summarise in a paragraph and send through the lecturer’s e-mail address. They were equally taught the same topic in teacher-centered class.

After completing the activity session, the students in both groups were asked to answer five comprehension questions on the topic, “Gas Behaviour” and also summarise the topic in a paragraph. The analysis was based on the students score from comprehension tests and summary of the topic read. Furthermore, questionnaire was administered to the subjects to determine the effectiveness and value of the two approaches.

Findings

Research question 1

Is technology-integrated learning more effective than teacher-centered learning method? The research question was answered based on the performances of TCL and TIL groups on the comprehension test. Tables 1 and 2 reveal the subjects’ level of comprehension.

<table>
<thead>
<tr>
<th>Ability to understand inferential questions</th>
<th>Correctly Answered</th>
<th>Incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to understand factual questions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability to understand structural questions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability to understand conjectural questions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Word Comprehension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Table 1 Summary of the Activities of Teacher-Centered Learning Group
Table 2: Summary of the Activities of Technology-Integrated learning Group

<table>
<thead>
<tr>
<th></th>
<th>Number of QTNS</th>
<th>Correctly Answered/%</th>
<th>Incorrect/%</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ability to answer inferential questions</td>
<td>20</td>
<td>9 45%</td>
<td>11 55%</td>
</tr>
<tr>
<td>2</td>
<td>Ability to answer factual questions</td>
<td>20</td>
<td>8 40%</td>
<td>12 60%</td>
</tr>
<tr>
<td>3</td>
<td>Ability to answer structural questions</td>
<td>20</td>
<td>16 80%</td>
<td>4 20%</td>
</tr>
<tr>
<td>4</td>
<td>Ability to comprehend conjectural questions</td>
<td>20</td>
<td>7 35%</td>
<td>13 65%</td>
</tr>
<tr>
<td></td>
<td>Word comprehension</td>
<td>20</td>
<td>18 90%</td>
<td>2 10%</td>
</tr>
</tbody>
</table>

Table 1 reveals that the subjects under the TCL group performed well in inferential, factual and conjectural questions. This shows that the TCL method helped the students to understand the topic better. On the other hand, Table 2 shows that the TIL group performed better in structural and word comprehension test than the TCL group. The implication is that the subjects in the TIL group utilized the pop-up dictionary in the computer which helped them to excel in vocabulary and structural questions.

Research Questions: 2 and 3

2. What are the attitudes of students towards teacher-centered learning methods?
3. What are the attitudes of students towards technology-integrated learning method?

The two groups were interviewed to determine their attitudes to both methods. The responses from Group 1 subjects – TCL were recorded in Table 3 below.

Table 3: Response to questions on the preferred method from TCL

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Preferred teacher centered learning to TIL</td>
<td>Yes = 7</td>
<td>No = 3</td>
</tr>
<tr>
<td>2</td>
<td>Enjoyed teacher-centered learning method more than TIC method</td>
<td>Yes = 5</td>
<td>No = 5</td>
</tr>
<tr>
<td>3</td>
<td>Understood lecture notes from the lecturer than topics on the internet</td>
<td>Yes = 8</td>
<td>No = 2</td>
</tr>
<tr>
<td>4</td>
<td>Understood the topic when taught and explained in class than asked to browse</td>
<td>Yes = 7</td>
<td>No = 3</td>
</tr>
<tr>
<td>5</td>
<td>Gained more understanding from teachers explanations</td>
<td>Yes = 6</td>
<td>No = 4</td>
</tr>
<tr>
<td>6</td>
<td>Became more active and interactive through teacher-centered learning than TIC</td>
<td>Yes = 2</td>
<td>No = 8</td>
</tr>
<tr>
<td>7</td>
<td>Preferred teacher-guided reading to independent reading</td>
<td>Yes = 6</td>
<td>No = 4</td>
</tr>
<tr>
<td>8</td>
<td>Transformed my reading habit through TCL than TIC</td>
<td>Yes = 3</td>
<td>No = 7</td>
</tr>
<tr>
<td>9</td>
<td>Preference for activities in classroom than TIL</td>
<td>Yes = 4</td>
<td>No = 6</td>
</tr>
<tr>
<td>10</td>
<td>Participated more in learning through the help of teachers and developed confidence in reading in TCL than TIL</td>
<td>Yes = 4</td>
<td>No = 6</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>52</td>
<td>48</td>
</tr>
</tbody>
</table>
The result presented in Tables 3 and 4 revealed that out of 100 subjects that made up TCL group, 52 preferred TCL to TIL method while 48 preferred TIL methods.

Again, out of the 100 subjects that represented TIL group, 51 preferred TIL method to TCL as against 49 who preferred TIL method. These observations revealed that both groups benefitted from the two methods.

**Discussion of Findings**

The analysis of items in Tables 1 and 2 revealed evidence of better understanding of the topic by teacher-based group than Technology-integrated group. Group 1 subjects were able to answer inferential, factual and conjectural questions better by scoring higher than Group 2 in the three aspects; while Group 2 subjects excelled in structural and word comprehension questions. This finding is supported by Tanok and Sagely (2004) observation that students using the computers spend more time and effort learning technical skills than working on the topic sent to them. Group 2 was more enthusiastic to use the computer than to learn the topic assigned to them. Although this situation might initially seem like a drawback to using computer for reading; it must be noted that once the zeal for technical skills is ignited, computer can be used for the acquisition of knowledge in various areas of study.

TCL group scores on summary text were higher than TIL group. It was observed that the newness or novelty of computer use and activity in lecture rooms may also have distracted the subjects from focusing on the content of the activities. While TCL group showed greater understanding of the content, the study revealed that TIL group performed better than TCL group in word comprehension assessment. TIL group progressed more than TCL group in word and terminology comprehension. The researchers observed that the subjects in TIL spent time to check their spellings and structures, the students used pop-up-dictionary in the computer more often than TCL group. This activity improved the students’ vocabulary and expression power and made them excel in vocabulary and structural questions.

The TCL hardly created room for instant consultation of dictionary as TCL method does. The use of pop-up dictionary in the computers has a great impact on vocabulary development and proficiency in reading comprehension. According to Onuha (2003), the use of pop-up dictionary is a helpful intervention for improving overall reading comprehension skills. This shows that learning through the Internet search helps students to develop their vocabulary.

In fact, many interrelated factors improve students’ reading habits in TIL. For instance, TIL group were more participatory and engaged in the learning activities than those in TCL. There is a shift from passive to active learning. Computer-mediated learning heightens students’ motivation to read and learn and personal development. Reading is more personalised in TIL than TCL.

The implication is that since motivation is necessary for learning, the use of computer in learning motivates students and ultimately enhances their zeal or enthusiasm to read. The study revealed that TIL strategy provided greater
flexibility for the students; there was qualitative change in reading habits, and increased engagement on time and task. This fact implies that the use of tools mediates intellectual growth. In TIL class, skills were not only transmitted but also the students were transformed to engaged readers. The study, therefore, corroborates Vygotski (1978) who opined that learning is a transformation and not just a transmission of knowledge.

In TCL classroom, the teacher was primarily responsible for determining the pace and selection of work content in the classroom. The students depend on the teacher for explanation and interpretation of concept. The students had a deeper understanding of concept and facts.

Furthermore, the responses to the questionnaire by TIL group who were exposed to both methods revealed that the subjects benefited from both methods.

Conclusion
There is a relationship between technology and learning. Technology has an increasing influence throughout the higher learning. The interactivity through the computer provides modes of learning that lecture note cannot provide. As computer technology provides the same research proven support that humans have provided and adds various modes of interactivity, students should be encouraged to read by integrating technology into learning through the internet. This will reduce their reliance upon instructors and lecture notes.

However, technology does not replace a good teacher. It serves as an important and emerging role in supporting students learning. Good teaching calls for different methods and literacy-rich environment that support personalized learning.

Since computer-mediated learning is a kind of learning method, there is the need to enhance the level of digital inclusion in our lecture rooms. The implication is that the number of Nigerians using technology tools will increase. This fact is very important for pedagogical goal.

Recommendations
1. The researchers recommend that instructors and students be trained and be equipped to use computers because teachers and students who are not comfortable using computers will not incorporate computer technology into the classrooms.

2. Computer should be made available and accessible to both teachers and students. The use of computers should be integrated into different courses so that students will gain enough experience with technology. There is need for further research on the effects of other aspects of technology in classroom teaching.

REFERENCES


