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Kotebe University of Education

Tel: +251-118550087

+251-118134364

+251-116602144

Website: www.kue.edu.et/

E-mail: info@kue.edu.et/

P.O.box: 31248

Editor's Note

Welcome to Kotebe Journal of Education volume 1 issue 2. As we sail into the edition of the journal, I would like to convey my feelings to you who are involved throughout the process. I congratulate to all the members of the editorial board, authors, reviewers and fellow education specialists. As a team with the mission of disseminating the wisdom of education, where idea leads as a matter of fact, the journal's journey is to reach every corner and spot of the world. Hence, it is our objective to provide scholars in the field of education a world class platform to put forward their scientific work and research and reach out their research work throughout the globe. With this commitment and determination, the journal will serve its cause and goal to promote and spread scientific research information in the field of education available to all.

This issue of the Journal has incorporated insightful research article on issues of Education. In an effort to present articles of broader significance, and to incorporate pressing educational issues of intellectual engagement into the Journal, works of different authors coming from different spheres of education were included. The managing editor and the associate editors of the Journal have gone through each article for their thematic relevance, quality, rigor and scope. The subject area reviewers of the articles have critically reviewed the articles from the vantage point of their own disciplinary perspectives. The review process of each manuscript was rigor since the aim was not to just publish. The review process considered the idea of creative dialogue instead of criticism of the original article. The reviewers were inclined more to the development and further analysis of the articles' ideas – as deem fit- rather than mere criticism and demeaning. As a result of the team endeavor by the reviewers, editors and authors, very interesting insights are incorporated in the different articles included in this issue. We hope that discussion of the widely-distributed phenomenon of scholarly interest will be shared not only among the educators but also anybody interested in education in general.

As the editor-in-chief of the journal, it is my wish that all fellow scholars in the field of education across the globe will benefit from the platform. We are counting on researchers' participation to ensure the scale up of the status of the journal. I thank all the scientific community who participated as authors, reviewers, editors and the prospective readers of the issue for their support and encouragement.

The Editor-in-Chief

Kotebe Journal of Education (KJE)

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Original Article

Perceptual Differences towards Digitalizing EFL Learning among Rural Grade Two Learners in Chemba District, Tanzania: The Case of Vocabulary Mobile Application

John Biseko

Department of foreign language and literature, University of Dodoma, Tanzania
Email: *drbiseko.udom@yahoo.com*

Abstract

Recent developments in digital technologies have necessitated the use of digital learning materials in education and EFL learning in particular. While previous studies affirm that digital technologies facilitate EFL learning, few studies in Tanzania have focused on this area. This study, therefore, was an attempt to shed light on this matter. The paper presents part of the findings of the design-based research in which the author was a team member. Participants were 20 grade 2 pupils (8 years old) and 7 teachers from Chemba district, Dodoma region, who were purposely sampled. The researcher used semi-structured interview sessions and observation methods to collect the data, and inductive thematic analysis was adopted for data analysis. The results revealed conflicting opinions regarding the use of the designed mobile application as a resource for EFL vocabulary learning. While the learners were positive about the use of the mobile application, teachers were divided on the matter. On the one hand, most of the young teachers in the sample recommended the use of the approach, while the old teachers and only one young teacher, on the other hand, and discouraged the application. This study regards such contestations as a battle between traditions and modernity in the field of EFL learning. The study therefore, recommends awareness training for teachers so that they can take advantage of such digital materials to enrich EFL learning and vocabulary learning in particular.

Key words: Digital learning materials, mobile application, vocabulary learning, learners' perception, teachers' perception

1. Introduction

In light of recent digital technological advancements, discussions in educational research have focused on how education practices can benefit from employing technologies (Colpaert, 2020). In

English as a Foreign Language (EFL) learning, the changes experienced in digital technologies have resulted in the emerging of new approaches to the teaching and learning of English in EFL contexts. These approaches include computer-assisted language learning, famously known as CALL (Levy, 1997), computer-enhanced language learning, famously known as CELL, technology-enhanced language learning, famously known as TELL (Patel, 2017), and mobile-assisted language learning, famously known as MALL (Kukulska-Hulme & Shield, 2008; Rodríguez-Arancón et al., 2013). Consequently, several studies have investigated the benefits of applying various forms of digital technologies to language learning (Zakian, 2022). These studies, therefore, have revealed significant findings in areas like mobile technology and EFL learning (Govindasamy et al., 2019; Ma, 2017), the usefulness of computer games in EFL learning (Butler, 2015; Klimova & Kacet, 2017), the use of e-books in EFL classrooms (Ghafar, 2024; Park & Lee, 2021), the role of film and television series in EFL learning (Ashcroft et al., 2018; Csajbok-Twerefou, 2010), digital stories in EFL classrooms (Fu et al., 2021; Karimova et al., 2023; Lim, et al., 2022), the use of YouTube videos in facilitating EFL learning (Seilstad, 2012; Terantino, 2011), and the use of blogs in EFL classrooms (Ahluwalia et al., 2011; Aydin, 2014).

Studies in digital technologies, therefore, report that despite the challenges associated with the use of the technologies, EFL learners gain a lot when applying different digital technologies in learning. Among others, researchers report on the interactive advantage that digital technologies provide (Ahluwalia et al., 2011; Aydin, 2014). For instance, Richards (2014) proclaims that digital learning materials provide social, multimodal, and interactive opportunities that allow learners to interact with people from different parts of the world. Such interactive forums allow learners to ask questions, answer questions, and participate in discussions and debates. For example, Ahluwalia et al. (2011) found that the use of blogs allowed their learners to interact with other people. This was possible as they had an opportunity to read other people's comments and write their own. Through this way, learners developed writing and reading skills, got exposure to autonomous language learning, and got acquainted with authentic use of the language. Thus, Richards (2014) considers that digital technologies provide learners with a more engaging environment for language learning than what they get when using textbooks.

Further research findings report that digital technologies facilitate an immediate learning environment, encourage self-directed learning, and motivate learners to learn. Regarding the immediate learning environment, Haleem et al. (2022) commend the role of digital technologies

in helping learners get prompt answers to questions they face in the course of learning. As far as encouraging self-directed learning, Morris & Rohs (2023) show that digital technologies have a potential effect on supporting learners' self-directed learning. This implies that technologies play a role in transforming education from the old perspective, which puts a teacher at the centre of learning, to a modern perspective that advocates for learners' autonomy (Beattie, 2020; Bocanegra & Haidl, 1999; Ishemo, 2017; Mpho, 2018; Tabulawa, 2006; Wohlfarth et al., 2008). In respect of motivating learners, Seilstad (2012) and Hafner et al. (2015) affirm that digital resources motivate learners to learn and practice the target language without fear. This is different from what happens in normal classrooms, where several learners are unwilling to practice some language skills because they feel shy in front of fellow students (MacIntyre, 2007).

Researchers have also investigated the impact of digital materials on developing EFL language skills. Maros and Saad (2016) reported that international students in their study developed English language skills through watching television programmes and movies. Govindasamy et al. (2019) and Ma (2019) show that learners developed their vocabulary knowledge through the use of mobile phones. In other studies, Pickard (1996) and Suh et al. (1999) found that learners developed receptive skills through listening to radio programs, watching TV, and watching films in English. These results therefore demonstrate that digital technologies provide opportunities for EFL learners to learn the language outside the school timetable. The technologies also allow learners to access native speakers' cultures so easily. However, Aydin (2014) suggests that well-planned tasks in digital materials have good results in language learning. Therefore, teachers should guide their learners in the selection of materials that are useful. To make this fruitful, Aydin (2014) and Hafner et al. (2015) advise curriculum designers to address matters of digital literacy in teacher training curricula so as to prepare teacher trainees who are theoretically and practically aware of the role of digital learning materials in language learning.

With particular attention to vocabulary learning through mobile applications, the literature provides some advantages associated with this approach. One of the most studied areas is the role of mobile applications in vocabulary learning. Examples of studies on the matter include Ma and Yodkamlue (2019) among EFL learners in China. This was a comparative study in which the researchers compared the impact of learning vocabulary through mobile applications versus paper-based word lists. The results showed that students who used the mobile application in the experimental group performed better than their fellows in a control group who used a paper-based

word list. In another comparative study, Govindasamy et al. (2019) compared the impact of mobile applications and a paper dictionary on promoting word meaning among fifty EFL learners in Malaysia. The results showed that the use of mobile applications promoted learners knowledge in learning and understanding the meaning of targeted vocabulary compared to a printed dictionary.

In Africa, few studies are available in the area of mobile applications in EFL/ESL learning. Among others, these studies report that mobile applications have a positive impact on EFL/ESL learning. For example, a study by Ngesi et al. (2018) in South Africa showed that using mobile SMS and Mxit texts improved learners' performance in writing full sentences, punctuation marks, correct spelling of words, and producing acceptable grammar. In Morocco, Benlaghrissi and Meriem (2023) examined the impact of mobile applications on Moroccan learners' EFL vocabulary development. In this study, the researcher used experimental and control groups. The results revealed that learners in the experimental group performed better than their fellows in the control group. In Libya, Alsied (2019) conducted a study to examine the effectiveness of mobile phones among EFL Libya's learners. In this study, Alsied reports that the use of mobile phones was useful not only in vocabulary development but also in facilitating the learners' reading, listening, speaking, and writing skills. The data also demonstrated that Libya's EFL learners revealed positive perceptions towards using mobile phones in learning English.

As far as Tanzania is concerned, the literature reviewed shows that there is hardly any study on mobile use in EFL learning. Nevertheless, there are some studies on mobile use in education. Among others are Kiwhele and Bali (2013), Kafyulilo (2014), and Gibbons et al. (2018). Besides not addressing the issue of mobile use in EFL learning, neither of the studies involved young learners as participants. However, the studies provide valuable information on the perception of Tanzanian teachers towards learners' use of mobile phones for learning. In general, these studies show that a significant number of teachers had a negative perception of learners' use of mobile phones as a medium for learning. The findings indicate that teachers believe that mobile phones harm learners' behavior as most learners use mobile phones for non-educational purposes.

Despite the valuable information obtained from reviewed literature, very little is known about the perception of EFL Tanzania young learners and their teachers towards the use of mobile applications for vocabulary learning. The present study tries to shed light on this area. Specifically, this paper presents part of the data collected in the project that designed, developed, and assessed

a mobile application for vocabulary learning. The aim of this study was to minimize one of the challenges in EFL learning, namely, inadequate contact time between learners and comprehensible English language input. Therefore, deploying a drill-practice mobile application sought to maximize the opportunity for learner-vocabulary contact in an out-of-school context. Tanzania was an appropriate area for the study considering its multilingualism, with more than 120 ethnic languages that are spoken along with Kiswahili and English. This situation hinders learners' frequent contact with English-language input outside the classrooms. The study therefore answered the following two questions: (1) What is the perception of young EFL Tanzanian learners towards using a mobile application for vocabulary learning? (2) What is the sampled teachers' perception towards learners' use of a mobile application as a vocabulary learning tool?

3. Research Methodology

3.1 Research Design

The project employed the design-based research (hereafter DBR) paradigm and a qualitative approach to meet its objective. According to Wang and Hannafin (2005), DBR is "a systematic but flexible methodology aimed at improving educational practices through iterative analysis, design, development, and implementation, based on collaboration among researchers and practitioners in real-world settings (p. 9)." Several models of DBR have appeared in the literature. The present project adopted a three-phase model by McKenney and Reeves (2013). Thus, the project was divided into a preliminary phase, a prototyping phase, and an assessment phase. Figure 1 below illustrates the three phases, key activities in each phase, and data collection methods that were used in each phase.

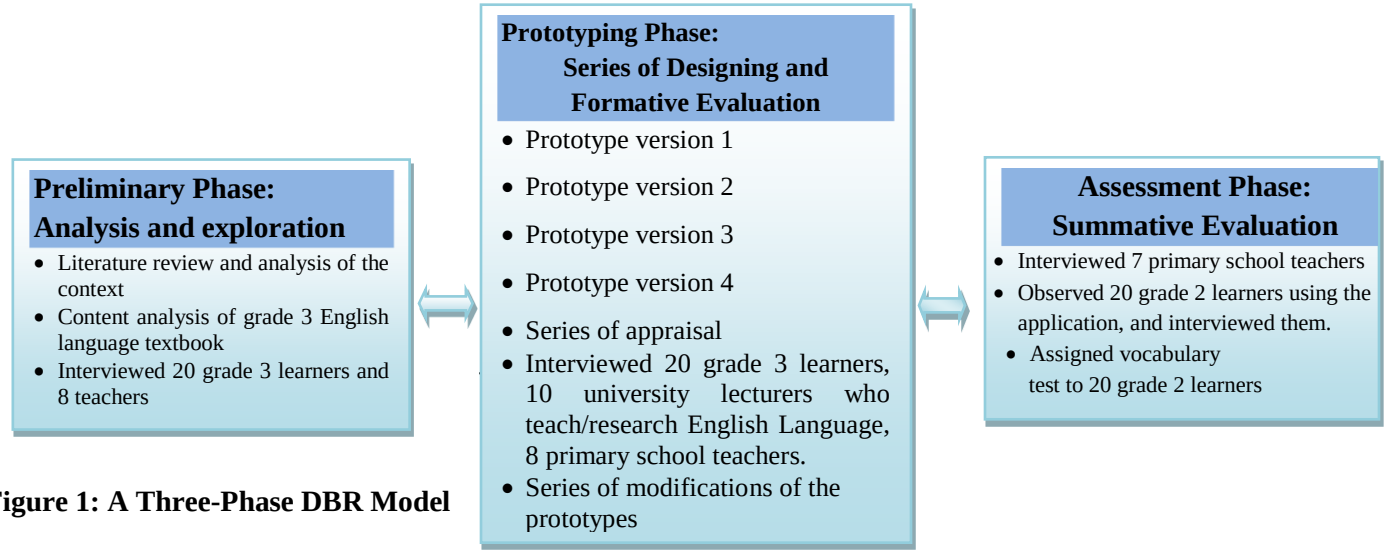


Figure 1: A Three-Phase DBR Model

Source: Adapted from McKenney and Reeves (2013)

The preliminary phase laid the foundation of the study. In this phase, the researcher performed four activities: carried out a literature review, conducted the context analysis, analyzed grade three textbook, and interviewed grade three learners and grade three teachers. This preliminary information was used to develop the first prototype.

Prototyping was the second phase of the project. In this phase, four prototypes were developed and appraised by different groups. The prototyping phase consisted of iterations of developing prototypes, appraising prototypes, and refining prototypes based on the appraisals provided in each version. Figure 2 below depicts the four prototypes and the process involved in getting them.

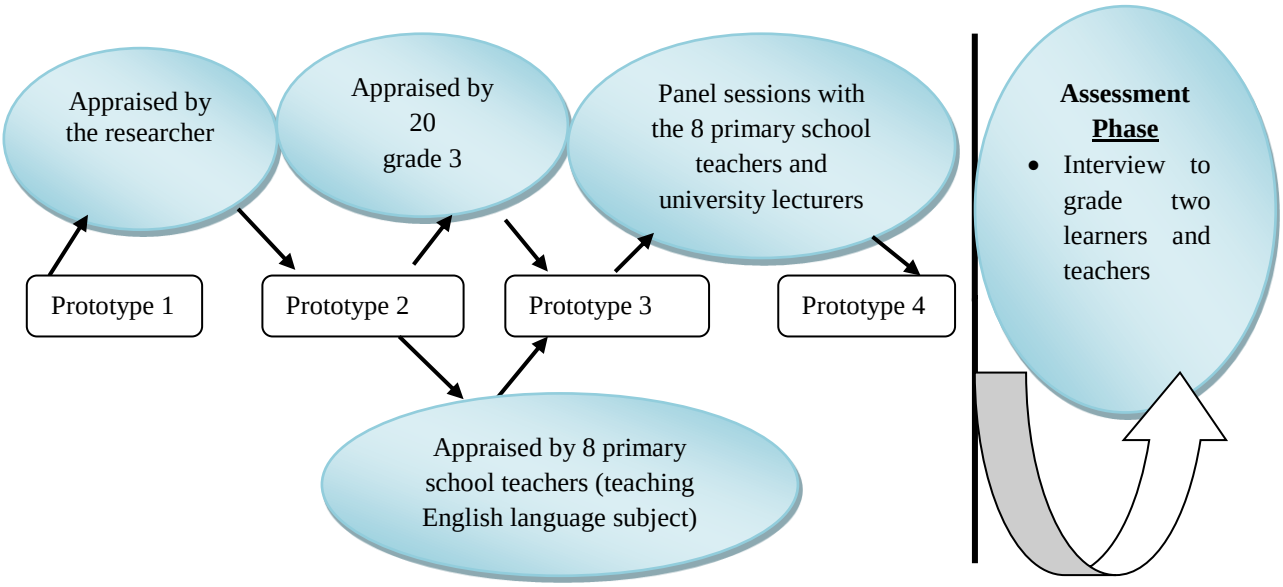
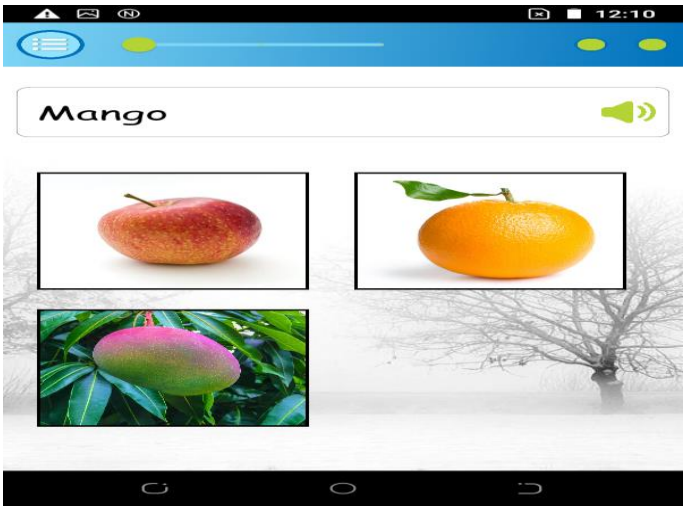


Figure 2: Stages for Developing Prototypes

Source: Adapted from Mafumiko (2006)

After accomplishing the prototyping phase, the product obtained was a drill-practice mobile application for out-of-school learner autonomy. The mobile application had 402 words from four word classes: nouns, verbs, adjectives, and a few adverbs. These words were obtained after analyzing grade three English language pupils' textbook. The mobile application exposed learners to three types of vocabulary knowledge: vocabulary meaning, vocabulary spelling, and pronunciation. In this drill-practice mobile application, the learners' task was to match the word and the picture when working with the meaning of words. Feedback was always given to check if one's matching was correct or wrong. For each word, there was a pronunciation button, which allowed the learners to listen to how the word should be pronounced. Picture 1 below shows one of the faces of the mobile application.



Picture 1: One of the Faces of the App

After the prototyping phase, the researcher took the fourth prototype into the assessment phase, and the data from this phase are what constitute the findings of the present paper.

3.2 Participants

The project involved teachers and learners in all phases. It is noteworthy that two groups of teachers and learners were involved in this project. The first group was involved in the preliminary and prototyping phases. These were important phases for designing and developing the vocabulary mobile application. Eight (8) grade three English language teachers from four (4) public primary schools were sampled for these two phases, which took place from May to November 2020. These teachers were intentionally selected based on their extensive experience in teaching grade three pupils for more than five consecutive years. As a result, they had amassed a wealth of knowledge and honed their individual teaching philosophies, which proved invaluable in the development of the mobile application. Besides, 20 grade three learners (about 9 years old) were also deliberately sampled based on the factors that: (1) grade three was a level where English as a subject began. (2) the learners were from the four schools where the sampled teachers came from, and (3) their parents had smart phones and volunteered to install all versions of the application and to provide their children with time to use the application. The data from this group of teachers and learners facilitated the development of the mobile application, and such data are not part of this paper.

Another group of teachers and learners were involved in the assessment phase of the project. These were seven (7) teachers from six schools, which were different from the previous ones. These teachers were also deliberately sampled based on the fact that they had taught English subject to

grade three learners for five or more consecutive years. Learners in this phase were 20 (about 8 years old) pupils who had completed grade two and were on annual leave, expecting to begin grade three a month later. This sample was preferred for two reasons: (1) these grade 2 pupils had not started learning English. This is because the subject is introduced for the first time in grade 3. Therefore, it was their first exposure to language through the mobile application. (2) The use of this sample was preferred so as to minimize external influences that would occur if grade three learners were involved. This was possible based on the fact that the vocabulary content of the mobile application was taken from grade three pupils' textbook. Thus, it could be difficult to measure the effect of the mobile application on vocabulary learning among the learners who were using a textbook with the same vocabulary in classrooms. In addition, learners in this group were also deliberately sampled based on the fact that their parents were ready to install the mobile application on their smart phones and allow their learners to access the material. The data from this second group of teachers and learners are what constitute the results of the present paper.

3.3 Data Collection Methods

This study applied interview and observation as the key data collection methods. While interview was used to collect data from both learners and teachers, observation was used to collect data from learners only. The two methods were preferred based on their flexibility and effectiveness in collecting data from children. It is worth noting that the learners were allowed to use the fourth prototype (the mobile application) for four weeks after it had been installed on their parents' mobile phones. During this period, the researcher and teachers in the sample visited each learner once a week. During the visits, the researcher had time for informal conversations with the learners in the presence of their parents or relatives. This was purposely initiated for the sake of gaining trust from the learners. After the fourth week, the researcher had time to interview each learner. Interview sessions took place at the learners' home, and to make them comfortable, learners were allowed to choose some relatives to accompany them during the sessions. Open-ended questions were purposely used to allow the learners in the sample to express their views, and the researcher applied probing techniques to make the participants generate more responses to the questions in focus. The interview method was also used to collect data from the seven teachers in the sample. Teachers were interviewed after they had visited the learners and observed them using the app for four weeks. All interview sessions were conducted in Kiswahili and were recorded by the voice recorder.

Non-participant observation was the second research method that was used to collect the required data from the learners. Like the interview, the observation method was also selected for this task based on the fact that it allowed data collection from children, particularly when the researcher had no intention to interrupt their behaviors. This method was used for four weeks. Each learner in the sample was observed four times in four different days while using the mobile application. During observation, the running record method was used to note down all spontaneously observed learners' behavior. A note book and a pen were the main tools that were used for collecting observation data.

3.4 Data Analysis

The collected data were analyzed qualitatively. First, interview data were transcribed in the same language. Thereafter, transcribed texts and audio materials were used to guide the inter-lingual translation of the texts (data) into the research language. Finally, the translated texts and observation data (that were in English) were coded and thematically analyzed using the inductive approach. The approach was preferred because it enabled the researcher to identify themes as they emerged in the data without the influence of any preconceived categories (Braun & Clarke, 2012; Bryman, 2016).

4. Results

4.1 Learners' Perceptions of Learning through a Mobile Application

The first research question sought to examine the perceptions of learners towards learning English vocabulary through the mobile application. The data collected from both interview and observation are used to describe learners' perceptions. However, for ethical purposes, special codes are used. These codes use three letters followed by numbers. The first letter stands for the word school, followed by a letter that identifies a specific school, for example, school A, B, C, D, E, and F.' The third letter is either 'L' for the word **learner** or 'T' for the word **teacher**. Thereafter, comes a number, which stands for individual participant. Thus, SAL3 refers to **S**chool-**A**, **learner** number **3,** while SBT1 refers to **S**chool-**B**, **teacher** number **1**.

The data revealed that all learners in the sample had a positive perception of using the mobile application as a vocabulary learning tool. Three themes emerged from learners' data: learners enjoyed practicing learner autonomy; learners acknowledged that the mobile application assisted them in learning vocabulary; and learners showed readiness to use such medium for learning in

the future. As far as enjoying learner autonomy is concerned, the data show that learners enjoyed independent learning and showed self-management in learning in terms of planning what to achieve and when to learn. More importantly, the data suggest that self-directed learning offered significant learning potential for students. Some of these data are presented below.

> *I use the mobile application every day because I want to understand all the words in the application. [SAL3]*
>
> *I enjoy learning the English language at home. The mobile application helps me learn English with my sister. [SCL5]*
>
> *I use the mobile application every evening when my father is at home. The mobile application is easy to use, and no one helps me to use it for learning. [SDL3]*
>
> *I like the mobile application because I can learn English independently. I learnt many words in a few days. This makes me happy. [SDL5]*
>
> *I like the mobile application because I have been able to learn many words on my own. [SFL1]*

The data above show that the mobile application had a significant potential to motivate learners' autonomous learning. As a result, learners were motivated to use the mobile application almost every day (as some of them claimed). This suggests that they had enough time to interact with the English vocabulary. The data also demonstrate that the mobile application was pedagogically relevant as it was an important driving force that motivated the learners to tirelessly undertake the activities in the mobile application, maintained learners' interest in the mobile application, and fostered learners' vocabulary learning and self-evaluation. Therefore, the data suggest that the main objective of the project, which was to provide more time for these learners to interact with English vocabulary was achieved. The interview data above are supported by observation data, which show that the researcher noticed excited learners using the mobile application independently. The following data from the researcher's running records clearly describe the situation.

> *[SBL2] is using the app independently. She is using it enthusiastically, then she asks her sister, "Do you know what a fish is?" [notes taken in one of the observation sessions]*.
>
> *For the past hour that I have been observing, [SFL5] has been busy working with the mobile application. Thereafter, he goes to his mother*

> *and says, "Now I know banana, orange, and mango" [notes taken in one of the observation sessions].*

The results of the interview questions asked to learners also showed that most of them were confident that the mobile application was useful for learning. The following below are some of the learners' answers in response to interview questions.

> *Yes, I like the mobile application because it has assisted me in learning the meaning of many words that I was not aware of before. [SAL1]*
>
> *The mobile application is interesting because it teaches me the meaning of words and pronunciation…but spelling is difficult. [SBL5]*
>
> *I am very happy to learn the pronunciation of words. [SDL3]*
>
> *I am happy to use the mobile application because it has helped me learn how to pronounce different words. [SFL3]*

The above data show that learners were happy with the use of the mobile application for vocabulary learning. The data further demonstrate that the mobile application had a significant effect on learning vocabulary knowledge, particularly the meaning and pronunciation of English words. However, each learner was able to learn a certain vocabulary knowledge of interest. The data show that while some learners reported to have taken advantage of learning word meaning, others reported to have learnt pronunciation. Nevertheless, interview responses from the learners show that some learners failed to learn some vocabulary knowledge, like vocabulary spelling. These findings therefore imply that while a certain mobile application can help learners develop a certain specific knowledge, it can fail to assist them in developing another knowledge. This is a lesson to teachers that, to achieve the learning objectives, they are required to be careful enough when selecting mobile applications for their learners.

The last theme which emerged from learners' data was their readiness to use the mobile application as a medium of learning in future. The data below support this theme.

> *I am happy to learn English through a mobile application. I think I will get another opportunity to use it in the future. [SCL4]*
>
> *I am satisfied to learn vocabulary through this mobile app. I will be happy to see other apps for other topics. [SEL4]*

I request that you bring other mobile apps for other subjects. [SFL3]

The data above indicate learners' positive response towards using the mobile application for learning, specifically to learn English vocabulary. The students expressed happiness and satisfaction with the experience they had, showing a readiness to engage with more mobile applications. The fact that it was the students' first time using such a technology and they still expressed comfort with it suggests that they found the application user-friendly and effective for their learning needs. This implies that the application was well-designed and easy to navigate, contributing to a successful learning experience. Furthermore, the students not only expressed a desire for more applications on different topics but also specifically requested additional applications for other subjects. This demonstrates a genuine interest in incorporating the technology into their learning across various subjects, indicating a willingness to engage with digital resources for their education in a broader sense.

4.2 Teachers' Perceptions towards Learning through a Mobile Application

Understanding teachers' perceptions of learning through the mobile application was the second research question that the present study examined. Teachers' responses to interview questions showed that they held two different perceptions regarding learning through mobile applications. On the one hand, three teachers had a positive perception and believed that the mobile application was useful for their learners. On the other hand, four teachers had a negative perception of using the mobile application and did not consider it to facilitate learning.

The three teachers who had a positive perception of the use of the mobile application for learning were all 'digital natives' in their early thirties. 'Digital natives' is the term coined by Prensky (2001), referring to the generation of people who were born and raised in the technological era. These teachers claimed to have sound knowledge of the use of technological devices like desktops, laptops, and smartphones. The teachers claimed to have used digital materials in learning; nonetheless, no one declared to have used the same in teaching. These teachers considered that the mobile application was useful to learners. They were also confident that the application would eventually assist learners in developing knowledge of the target vocabulary. The data also show that these teachers had a belief that the mobile application was useful for motivating learners' self-directed learning, promoting edutainment among the learners, and providing learners with ample time to revise the target vocabulary whenever using the application. On top of that, the teachers

also had a desire to see that more pupils would get the opportunity to use the application for learning. Teachers' voices in the quotes below reveal the belief they had in the mobile application.

> *I wish all learners in our school would get the opportunity to use the mobile application. [SAT1]*
>
> *Learning like this will encourage learners to learn without being pushed. As you can see, she is enjoying using the application and seems as if she is playing, but eventually, her knowledge of the vocabulary content will be tremendous. [SAT 1]*
>
> *It is very useful; it will assist learners in acquiring vocabulary. I congratulate the researcher for including the pronunciation of words in this mobile application. [SDT1]*
>
> *This mobile application will help learners develop vocabulary size, meaning, and pronunciation. They will learn many words because they encounter the same words whenever they use the application. [SDT1]*

In contrast, four teachers had a negative perception of learners' use of the mobile application for learning. It is, however, worth noting that among the four teachers, one was a 'digital native', ranging from 30 to 35, and three were 'digital immigrants'. Prensky (2001) describes that digital immigrants as people who were born before the digital age. However, these people had to adopt some technological use at later points in their lives. These three later teachers were in their late fifties. These four teachers had these comments in relation to learners' use of the mobile application for learning:

> *I propose to add the role of the teacher in this application because our learners can hardly learn on their own without being supervised. [SBT1]*
>
> *Our learners only participate in learning when a teacher is inside the classroom. When a teacher goes out of the classroom, each of them turns to playing. I am puzzled to hear that learners are given the mobile app so that they can learn independently. Surely, I believe they will use their time playing with the application. [SCT1]*
>
> *I am not supporting it because I know our learners. Even if you give them books, very few of them will learn at home.* If they can't use books, can they use the mobile application? [SCT1]
>
> *This mobile application can only make these learners boastful. They can develop an attitude that they can learn without teachers, and that can change their behavior towards school attendance and teachers. [SET1]*

> *Learners cannot be attentive to the content the way they do in classrooms but will only use their mobile application for playing and wondering about the voices and pictures. [SFT1]*

What can be inferred from the data above is that, regarding teachers' perspectives on the use of a mobile application for learning, there is a consensus among them that learners heavily rely on teacher supervision and traditional learning materials like textbooks. They express doubt in the effectiveness of digital tools for independent learning, citing concerns that learners may prioritize entertainment over educational content. Additionally, teachers fear that the mobile app could lead to negative attitudes towards school attendance and teacher authority, potentially fostering a sense of self-sufficiency that could impact their overall behavior and engagement in the classroom. These insights highlight the teachers' skepticism towards the application's ability to facilitate meaningful learning experiences and raise important considerations about the role of teachers in guiding and supporting students' learning journeys.

5. Discussion

The results of the present study show that there were mixed perceptions in relation to young learners' use of mobile applications as a medium for vocabulary learning. The results in Section 4 reveal existing but silent contestations between traditions and modernity in EFL learning. In particular, the present results depict conflicting opinions on the role of mobile applications in facilitating vocabulary learning among EFL learners. On the one hand, learners and some teachers in the sample have a positive perception of the use of the mobile application for learning, while on the other hand, other teachers are suspicious of the usefulness of the mobile application as an appropriate learning resource. The present study therefore reveals that there are about three conflicting perspectives within the traditional-modernity dispute. These are: (1) the perspective that learning takes place when learners are under teachers' control versus learner autonomy (2) the perspective that learning takes place through reading books versus acquiring knowledge through digital materials; in this context, mobile applications (3) the perspective that mobile applications have a negative behavioral impact on learners versus the positive advantages of mobile applications in EFL learning.

The results show that some teachers, including SBT1 and SCT1, strongly emphasized that learners could not learn without teachers' supervision. Such teachers' views originate from the traditional perspective of learning. This perspective considers teachers' power to set standards and tight

control over learners as important practices for learning to take place (Tabulawa, 2006; Wohlfarth et al., 2008). Tabulawa (2006) further clarifies that, under this approach, learners can neither express themselves nor control their learning. Instead, they always remain passive recipients of what teachers direct. In the literature, this approach has several labels, including the traditional style of teaching (Tabulawa, 2006; Wohlfarth et al., 2008), the old model of teaching (Ishemo, 2017; Mpho, 2018), and the outdated method (Beattie, 2020). The learning view of SBT1 and SCT1 is in contrast with modern views of learning, where learner autonomy is encouraged. Learner autonomy is a modern language learning approach that advocates for learners' activeness in learning. In this view, learner autonomy calls for responsible and independent learners (Wohlfarth et al., 2008). Synonymous terms for learner autonomy in the literature suggest that learner-centeredness is a key feature of autonomy. These synonyms are self-management, self-learning, self-directed learning, self-instruction, self-access learning, learner-centeredness, and learner independence (Bocanegra and Haidl, 1999).

In relation to the findings of the present study, conflicting perspectives between the views that learning takes place when learners are under teachers' control versus learner autonomy are evident when comparing the data provided by some learners versus those by teachers. In particular, the data from some learners, including [SAL2], [SAL3], [SCL5], [SDL3], [SDL5], and [SFL1], contrast with the data from some teachers, including [SBT1] and [SCT1]. In these data, learners express their enthusiasm for enjoying independent learning, while identified teachers maintain that learners at this level cannot learn without teachers' supervision. This dispute shows that some teachers perceive the learning process using the traditional lens. Consequently, they discourage enthusiastic young learners from taking advantage of using technology for knowledge gain.

The findings also depict that learners comfortably used the mobile application and reported that they learnt vocabulary knowledge through the designed mobile application. Learners' reported learning experience challenges the four teachers' views about the usefulness of the mobile application in vocabulary learning. While [SAL1], [SBL5], [SDL3], and [SFL3], among others, declared that the mobile application helped them to learn vocabulary, teachers like *[SBT1]*, *[SCT1]*, *[SET1]*, and *[SFT1] remained suspicious that the mobile application would not assist learners in acquiring knowledge.* The experiences reported by learners support what Alsied (2019), Benlaghrissi and Meriem (2023), and Govindasamy et al. (2019) found in their empirical studies. However, the differences between the present and previous studies are in the areas of

research approaches used, age, and socio-cultural background of the learners. Therefore, the present study extends the previously reported results by suggesting that mobile applications are also useful for vocabulary learning among young learners.

The finding that learners can benefit from digital materials brings hope to digital natives, especially in this era when the focus of language education has changed from grammar-based to functional-based learning. In support of this, Ahmadi and Reza (2018) argue that digital materials provide a lot that neither textbooks nor teachers can offer in traditional classrooms. In line with this, Dawson et al. (2008) believe that digital materials change language classes into active places where learners interact with meaningful tasks that facilitate communicative competencies.

The present study challenges the commonly reported research finding that EFL teachers have positive perceptions of the use of digital materials for EFL learning. Among others, such studies include Al-Said (2015), Anggeraini et al. (2019), Demiroz and Turker (2020), Ebadi and Bashiri (2018), and Mundy et al. (2012). In contrast, this study has revealed that there are conflicting perceptions between learners and teachers and among teachers regarding the use of mobile applications for learning. In light of this finding, it is apparent that such conflicting perceptions represent traditional versus modern views of learning. On the one hand, some teachers, particularly those in the group of 'digital immigrants', have a negative perception towards the use of technologies in EFL learning and seem to glorify traditional learning practices, while learners, on the other hand, admire newly technological innovations in EFL learning.

The finding that teachers had a negative perception towards learners' use of mobile applications is partly a result of both the traditional perception they hold about the learning process and their unpreparedness to break the inherited old-fashioned teaching. This finding complements the findings by Gibbons et al. (2018), Kafyulilo (2014), and Kiwhele and Bali (2013) in Tanzania, Fried (2008) in South Africa, and Mafuraga and Moremi (2017) in Botswana, who reported that teachers had a negative perception towards learners' use of mobile phones for learning. The finding therefore reveals the need to train teachers so that they can be not only aware of the benefits of using mobile applications for learning but also motivated to take advantage of them.

Lastly, the results of this study dispute the findings by Mfaume (2019) that young teachers are always eager to use digital materials, while senior teachers are not. As far as this study is concerned, it is apparent that some young teachers are also reluctant to use digital materials,

believing that they are not effective and facilitative for EFL learning. This finding is in line with that of Mahdi and Al-Dera (2013), who assert that teachers' experience and exposure rather than age affect one's consideration of digital materials in education. Therefore, the present findings suggest that exposure and experience are determinant factors for teachers to appreciate digital materials as genuine learning media.

6. Conclusion

Generally, the present study has revealed silent contestation over the use of mobile applications in EFL learning among young learners and teachers in primary schools in Tanzania. In particular, the findings show that learners acknowledged that the mobile application facilitated learning, while most of the teachers in the sample did not consider mobile phones as beneficial because they believed that learners could not learn without teachers' supervision. This study regards the present dispute between learners and teachers and among teachers as the battle between traditions and modernity. Therefore, this study recommends that curriculum designers should consider including topics about the use of digital materials in the EFL teachers' training curriculum. This will help EFL teachers acquire the right perspective on the materials and the skills to select useful materials to use in EFL learning.

Declaration of Conflicting Interests

The author declares that no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Original Article

An Investigation of the correlation between motivation and students' Academic achievement in science courses: The Case of Degree Students at Kotebe University of Education

Daniel Zewdie

Current affiliation: Department of education St. Mary's University, Addis Ababa, Ethiopia

Email: *dzewdie86@gmail.com*

Abstract

The study aimed to examine the correlation between students' motivation and their academic achievement explained in terms of Cumulative Grade point Average (CGPA) and investigated the motivational factors effect on the students' overall academic achievement in the Applied Science courses. 393 students were selected using both stratified and random sampling techniques from the regular students attending 2nd and 3rd-year degree programs at Kotebe University of Education. Data were collected using a questionnaire to measure the intrinsic and extrinsic motivation of the sample students on a 5-point Likert scale. The results reveal that the supportive behavior of students significantly accounted for 1% of the variance in CGPA. Besides, students' supportive and personal behaviors significantly explained about 2.2% variance in the criterion measure (CGPA). However, assessing the relative importance of each factor, "challenging oneself" and "the need for personal growth and development" significantly contributed to 1.1% and 1.6 % of the variance in CGPA respectively. Such a low proportion of variance in CGPA might be associated with the range of restriction in scores of both independent and dependent variables. Thus, among the intrinsic motivation these two components appeared to be the direct factors that influence students' CGPA in science courses. It could be inferred that students' strong internal motivation seems to advance their successful science learning and achievement. Thus, to help students be motivated to learn science tangibly, teachers' commitment in using interactive methods, providing reasonably challenging tasks, and giving timely feedback, through organizing the science teaching and learning environment is decisive.

Key words: academic achievement, correlation, extrinsic motivation, intrinsic motivation, science course

1. **Introduction**

The purpose of science learning is to improve students' understanding of the nature and application of science and its relevance to their daily lives. Students are expected to willingly continue their science study in school. However, in a study conducted by Lumsden (1994) the need for learning science seems to fade as children grow. Learning sometimes becomes coercion than pleasure, which in most cases students' lose interest in learning science subjects.

According to Beal and Stevens (2011), students' motivation in science learning is emphasized as supporting condition to the central principle of academic performance and critical thinking in school science. In addition, motivation refers to the reasons that initiate behavior, which is characterized by the students' interests, willingness, and desire. The effect of motivation in science learning is interpreted to be the leaping factor that enhances their performances in school science. Motivation in science learning, in this sense, includes extrinsic and intrinsic motivation, task value, and control of learning beliefs, and self-efficacy (Tuana, Chin and Shieh, 2005; and Bautista, 2012).

Kostelecky and Hoskinson (2005) defined motivation as an internal state that activates, guides, and maintains or directs behavior. It is one of the most important factors in higher educational institutions that influence students' performance. It is likely a necessary component for proper learning.

According to Ryan & Deci, (2000), student motivation can be seen from two angles: Intrinsic versus extrinsic motivation. Intrinsically motivated students strongly engage in learning out of interest, or enjoyment, or in order to achieve their own goals. It occurs when the activity is done with the free choice of the individual. It is the activity itself that rewards the intrinsically motivated behaviors (Ryan and Deci, 2000).On the contrary, extrinsically motivated students try to do assignments for the sake of achieving good score, praise, etc. and results from outside the student (Dev, 1998).

In our context, usually, students select and pursue their education in Social Sciences than Natural Sciences. One reason could be that the science courses are thought to be difficult to understand and demand lots of effort. As a result, students are observed developing negative attitude towards the science courses. Teachers even think that the solid sciences are challenging and require re-teaching and tutoring students for better conceptual understanding.

On the other hand, the country is striving to produce competent graduates with special attention to engineering, technology and natural sciences, through introducing high quality science and mathematics curricula at primary and secondary schools. Moreover, the recently adopted policy of the 70:30 university intake ratio is in favor of science and technology (MOE, 2010). Our University students are expected to demonstrate strong motivation, performance, and competence to achieve better on the science courses they are learning.

In Ethiopia, the number of Higher Education Institutes is increasing from year to year. For example, the number of public Universities has increased from two in 1991 to fifty in 2019 (MoE, 2019). Due to the expansion of higher education institutes, the number of graduating students is increasing from year to year, which worsened the unemployment of graduates (Wondwosen,2018; Salmi, Sursock and Olefir, 2017; Tamiru, 2017; and Hiruy**,** 2012). Consequently, the labor market is not absorbing graduates as expected and employers hesitate to employ graduates, thinking that they lack soft skills relevant for employment. Moreover, searching for jobs is becoming a hard task for graduates from year to year (Wondwosen, 2018; Tamiru, 2017; and Aklilu and Teshome, 2013; and Hiruy, 2012). Such conditions, might have a negative impact on students' motivation for learning in higher education.

Furthermore, students in science education face various challenges. They encounter lack of motivation, low self-confidence, difficulty in understanding science concepts, and inadequate instructional resources. Teacher characteristics, course contents, and learning environment, as well influence students' learning and achievement. These conditions have interested the author to conduct this research.

Several studies have been conducted to investigate student motivation on academic performance. According to Ames (1990), and Marshal (1987), a student's motivation is a valuable drive to the learner that creates a long-term, quality attachment in learning and initiates the process of learning. More profoundly, Bomia, *et al*. (1997) suggested that student motivation is student willingness, need, desire and obligation to participate and be successful in the learning process.

As said by Dev (1997) and Lepper (1988), a student who is intrinsically motivated is more likely to complete the chosen task and eager to challenge the activity. In this respect, motivation refers to

engaging in a task for one's own sake, for the enjoyment it provides, the learning it permits, or the feeling of accomplishment it evokes (Brophy, 1998; and Pintrich and Schunk, 1996).

Moreover, intrinsically motivated ones are more eager, self-initiated, demand challenges and feel happy in their studies, whereas extrinsically motivated ones feel compelled to learn, and put negligible amount of effort necessary to achieve maximum reward. Generally, students can be either intrinsically or extrinsically motivated to be successful in their learning (Ryan and Deci, 2000; Kamauru, 2000; Dev., 1997; Goldberg, 1994; and Lepper, 1988).

Eppler and Harju (1997) examined the relationship among college students' learning and performance goal orientation, in which they reported that students who had a learning motivation had completed more semesters. In similar studies, significant relationship was found between academic performance and motivation (Skaalvik and Skaalvik, 2006, and 2004; Broussard and Garrison, 2004; Sandra, 2002; and Johnson, 1996).

In a similar study, Remali et al., (2013) determined that there is a significant association between motivating elements and academic performance. Student motivation has a beneficial effect on academic performance, and was also an excellent predictor of GPA. Likewise, Abu Bakar et al., (2010) investigated the relationships between university students' achievement motivation, attitude and academic performance in Malaysia. The study result disclosed a positive significant correlation between students' attitude towards learning and achievement motivation. It was also indicated that students' attitude and academic achievement were correlated positively. On the contrary, the finding indicated a low and negative correlation between students' achievement motivation and their academic performance.

In a study conducted on freshman students at Bahir Dar University, motivational directions were found decisive in science achievement setting. It is, therefore, important to design intervention strategies with the aim of internalizing the value of education and achievement (Amare, 2014).

However, Moneta and Siu (2002) conducted two studies to examine whether intrinsic or extrinsic motivations are predictors of academic performance and creativity in Hong Kong as they are in North America. In the first study, unexpectedly, intrinsic motivation correlated negatively with year 1 self-reported GPA (r= -.24, p<.009), while extrinsic motivation correlated positively (r=.33, p<.001). These results indicated that the more intrinsically motivated a student is, the lower his or

her academic performance, and the more extrinsically motivated a student is, the higher his or her performance. Thus, the students who attain the highest levels of academic performance are those who are simultaneously low in intrinsic motivation and high in extrinsic motivation, and the students who attain the lowest levels of academic performance are those who are simultaneously high in intrinsic motivation and low in extrinsic motivation (Moneta and Siu, 2002).

According to Moneta and Siu (2002) in the second study, GPA was also positively and significantly correlated with extrinsic motivation (r=.38, p<.001) and negatively but non- significantly correlated with intrinsic motivation (r=-.12, p<.17). In turn, GPA was positively and significantly correlated with year-1 GPA (r=.38, p<.001). This pattern of correlations revealed that there is some degree of confusion.

Similarly, the regression analysis results designated that intrinsic motivation still was a significant, negative predictor of GPA, and extrinsic motivation still was a significant, positive predictor of GPA, whereas achievement motivation was positively but non-significantly associated with GPA. This study provided findings that are diametrically opposite to those obtained in North American colleges (Moneta and Siu, 2002).

Whereas in North America intrinsic motivation is conducive to higher pre-admission academic ability scores and course grades in college environment, intrinsic motivation is unrelated to pre-admission academic ability scores (perhaps negatively related) and is conducive to lower course grades. Furthermore, in North America extrinsic motivation is unrelated to both pre-admission academic ability scores and course grades, in college environment extrinsic motivation is conducive to higher pre-enrollment scores and course grades. These findings suggest that Hong Kong College's environment penalizes self-motivation and rewards outer motivation (Moneta and Siu, 2002).

As can be seen from the results above, it may be seen that there are inconsistencies regarding which motivational factor (intrinsic or extrinsic) really plays a decisive role and contributes most in energizing science learning. Thus, it is of great importance to investigate the degree of correlation and the effect of these motivational factors on students' achievement in science learning. The purpose of this study was, therefore, to investigate the correlation between motivational factors

(intrinsic and/or extrinsic) and their effect on students' academic achievement in learning science courses.

2. Research Methodology

2.1 Research design

The research was an ex-post facto design where the researcher did not have direct control over the independent variables because their manifestations have already occurred or because they are inherently not manipulated. In other words, this research was a descriptive and correlation study. The design focused on observing the degree of relationship between students' motivation and their effect measured on Likert scales questionnaire and their academic achievement (CGPA).

2.2 Population, sample, and sampling procedure

The target population of the study were second and third year students attending their education in the degree program in the Natural Science and Computational College at KUE. These groups were considered in the study since they are expected to cover most of the science courses by the time the data was collected (2^{nd} semester, 2017). Stratified and simple random sampling methods were employed orderly to select sampling units (study subjects) proportionally from their respective departments (i.e. Biology, Chemistry, Physics, Mathematics, Computer Science, and Environmental Science). As a result, 400 participants were selected.

2.3 Data collection and Analysis

The questionnaire developed by Neill (2004) was adapted and used to collect the required data. In the questionnaire, a total of 30 items were included. Of which, 10 scale items were used to measure students' intrinsic motivation, and 20 scale items to measure extrinsic motivation towards science courses. The researcher considered Neill's questionnaire since it was prepared with the purpose to investigate university student's motivation and satisfaction.

A pilot study was conducted and the scales under the intrinsic motivation were found to be reliable as their Cronbach's Alpha varied between .516 and .596. However, the sub scales that make up the extrinsic motivation did not seem reliable, because the reliability indices vary between .325 and .366, which were very low. On the other hand, the reliability index for each aggregate component, i.e. for the intrinsic and extrinsic motivation was 0.735 and 0.601 respectively. Finally, the

questionnaire was distributed to 400 sample students, and 393 of them completed and returned the questionnaire, and its return rate was 98.25%.

Data analysis was carried out based on the determined reliability indices, descriptive statistics (medians, standard deviations, and inter-correlations), exploratory factor analysis and multiple and stepwise regression analyses. In general, the statistical analysis was computed using Software Package for Social Science (SPSS), version 20 of statistical program (George and Mallery, 2003).

3. Results

3.1 Demographic Characteristics

The demographic characteristics of the sampling units are presented in Table 1.

Table 1 Samples of the Study

S. N	Departments	Regular Degree Program Students			
		Gender		Total	%
		M	F		
1	Biology	48	28	76	19.3
2	Chemistry	53	24	77	19.6
3	Physics	14	17	32	8.1
4	Mathematics	23	41	64	16.3
5	Computer Science	43	33	76	19.3
6	Environmental Science	20	48	68	17.3
Total		**201 (51.1%)**	**192 (48.9%)**	**393**	**100.0**

As can be seen from Table 1, 48.9 percent were females and 51 percent were males. Almost a similar percentage of students (19.3-19.6%) from Chemistry, Biology and Computer Science Departments were made to participate in the study. Between 16.3 to 17.3 percent of them were also selected from Mathematics and Environmental Science Departments. The least sample size was taken from Physics Department since they were few in number.

To see the trend of students' responses for better understanding, the Likert scale items on a 5 scale grouped into three categories are given in Table 2. Here, the responses strongly disagree and disagree into one group, and strongly agree and agree into another group and leaving the undecided as it was in the table below. For your information, the original 5 scale Likert data was not changed.

Table 2 Students' Responses as to their Intrinsic Motivation

N	***Statements***	***Responses***							
	I attend the university because---	***SDA/DA****		***UND****		***A /SA****		***Mdn****	***IQR****
		N	***%***	***N***	***%***	***N***	***%***		
1	*I want to understand oneself better.*	*21*	*5.3*	*49*	*12.5*	*313*	*82.2*	*4.00*	*1.00*
2	*I want to explore new ideas.*	*54*	*13.7*	*66*	*16.8*	*273*	*69.5*	*4.00*	*2.00*
3	*I want to challenge oneself.*	*36*	*9.2*	*45*	*11.5*	*312*	*79.4*	*4.00*	*1.00*
4	*I want personal growth and development.*	*43*	*10.9*	*36*	*9.2*	*314*	*79.9*	*5.00*	*1.00*
5	*I love learning.*	*30*	*7.6*	*63*	*16.0*	*300*	*76.3*	*4.00*	*1.00*
6	*I want to help others.*	*32*	*8.1*	*59*	*15.0*	*302*	*76.8*	*4.00*	*1.00*
7	*I want to contribute to the society.*	*23*	*5.9*	*42*	*10.7*	*328*	*83.5*	*5.00*	*1.00*
8	*I need to solve societal problems.*	*39*	*9.9*	*66*	*16.8*	*288*	*73.3*	*4.00*	*2.00*
9	*I want to improve the world situation.*	*28*	*7.1*	*33*	*8.4*	*332*	*84.4*	*5.00*	*1,00*
10	*I want to be more useful to the society.*	*176*	*44.8*	*82*	*20.9*	*135*	*34.3*	*3.00*	*3.00*

**SDA- strongly disagree, DA- disagree, UND- undecided, A-agree, SA- strongly agree, Mdn. – median and IQR-Interquartile range*

As observed in Table 2, the majority of students between 69 and 84.4 percent responded that they are attending the university by strongly agreeing or agreeing to the issues raised most. More specifically, they attended the university because they want to improve the world situation (84.4%), contribute to the society (83.5%), understand oneself better (82.2%), personal growth and development (79.9%), challenge themselves (79.4%), and help others (76.6%) and because they love learning (76.3%).

You can visualize that more than three-fourth of the students' responses strongly tilted to the right side of the Likert scale by agreeing (4) or strongly agreeing (5). This may indicate that there was a consensus on the issues raised by the sample students with a median of 4.00 and interquartile range of 1.00.

3.2 Inter-correlation Matrices

Examining the first research question that states, "What is the degree of relationship between students' intrinsic motivation and their academic achievement? And the corresponding alternative hypothesis, "There is a significant positive correlation between students' intrinsic motivation and their academic achievement" are critical.

To answer these, the inter-correlations among the non-parametric variables (intrinsic motivation of students) were computed using Kendall's correlation formula and summarized in Table 3 and 4.

Table 3 Inter-correlations among Items of Self-Explorations with CGPA

Kendall's tau_b	*understanding oneself*	*Exploring*	*challenging oneself*	*For personal growth*	*I love learning*	*CGPA*
understanding oneself	1.000	0.156**	0.166**	0.098*	0.203**	-.034
Exploring		1.000	0.202**	0.154**	0.163*	-.043
challenging oneself			1.000	0.128*	0.164*	0.058
For personal growth and development				1.000	0.053	0.078*
I love learning					1.000	0.045
CGPA						1.000

***Correlation is significant at 0.01 level (2-tailed)*
**Correlation is significant at 0.05 level (2-tailed)*

Referring to Table 3, it could be understood that "I am attending in the university to understand oneself" is significantly related with"---- to explore new ideas"(r=.156, p< 0.01), "--- to challenging oneself" (r=.166, p< 0.01), "---for personal growth and development" (r=.098, p< 0.05) and with "----I love learning" (r=.203, p< 0.01). Likewise, "----exploring new ideas" significantly correlated with "---challenging oneself "(r= .202, p< 0.01), with "---for personal growth and development" (r=.154, p< 0.01) and with "---I love learning" (r=.163, p< 0.01). So also "---challenging oneself "was correlated significantly with "---for personal growth and development (r=.128, p< 0.01) and with I love learning (r=.164, p< 0.01). However, only one variable from self-exploration variables, that is, "I attend in the

university for personal growth and development" correlated significantly with students' CGPA (r= .078, p< 0.05) though it was low.

Table 4: ***Inter-correlations among Items of Altruism with CGPA***

Variables	***To help others***	***To contribute to the society***	***To solve societal problems***	***To improve the world***	***To be more useful to society***	***CGPA***
To help others	1.000	.281**	.210**	.326**	.068	.064
To contribute to the society		1.000	.280**	.295**	-.073	.036
To solve societal problems			1.000	.244**	-.055	-.004
To improve the world				1.000	.003	.039
To be more useful to society					1.000	-.037
CGPA						1.000

***. Correlation is significant at the 0.01 level (2-tailed).*

As indicated in Table 4, one can see that the item that states "----to help others" is correlated significantly with variable "---to contribute to the society" (r=.281, p< 0.01), "---to solve societal problems"(r=.210, p< 0.01), "---to improve the world situation" (r=.326, p< 0.01) respectively. Similarly, the item, which refers "----to contribute to the society" is significantly related with "---to solve societal problems" (r=.280, p< 0.01), and "to improve the world situation" (r=.295, p< 0.01). So also, the item "----to solve societal problems" is significantly correlated with "----to improve the world situation" (r=. 244, p< 0.01). Nevertheless, no variable from the independent variables was significantly correlated with the criterion measure (i.e., CGPA).

3.3 Exploratory factor Analysis

Factor analysis is a useful statistical tool for investigating variable relationships for complex concepts, such as socio-economic status or psychological scales. It allows to investigate concepts that are not easily measured directly (i.e., intrinsic or extrinsic motivations) by collapsing a number of variables into a few interpretable underlying factors (Karen, 2016).

To determine the number of factors that contribute to the proportion of variance accounted in the dependent variable, factor analysis was carried out as presented below.

First KMO Bartlett's test was calculated to measure the sampling adequacy. The KMO measure is 0.841, which is acceptable, at .001 significant level (χ^2 = 532.731, p<.001, df. =45).To determine a goodness-of-fit test, which gives us an absolute of model fit, the chi-square test with non-significant values suggest a good fitting model. Failing to detect a non-significant departure from the model at the 5% level (χ^2 (1) = 33.812, p = 0.140, df. = 26). So, according to the maximum likelihood test criterion, a two-factor model seems reasonable for these data.

Chi-Square	df.	Sig.
33.812	26	.140

Table 5:**Communalities**

Variables	Initial	Extraction
Understand oneself better	1.000	.546
Exploring new ideas	1.000	.539
Challenging oneself	1.000	.244
For personal growth and development	1.000	.366
I love learning	1.000	.431
To help others	1.000	.312
To contribute to the society	1.000	.418
To solve societal problems	1.000	.475
To improve the world situation	1.000	.390
To be more useful to the society	1.000	.509

Extraction Method: Principal Component Analysis.

As observed in Table 5, among the variables, understanding oneself, exploring ideas, loving learning, contributing to the society, solving societal problems and being more useful to the society are with communality value more than 0.4 , which show how much of the variance in the variables has been accounted for by the extracted factors.

Table 6: ***Principal component analysis output for intrinsic motivation variables (Total Variance Explained)***

Component	***Initial Eigen values***			***Extraction Sums of Squared Loadings***			***Rotation Sums of Squared Loadings***		
	Total	***% of Variance***	***Cumulative %***	***Total***	***% of Variance***	***Cumulative %***	***Total***	***% of Variance***	***Cumulative %***
1	2.912	29.121	29.121	2.912	29.121	29.121	2.647	26.474	26.474
2	1.196	11.960	41.081	1.196	11.960	41.081	1.461	14.606	41.081
3	.942	9.423	50.503						
4	.855	8.548	59.051						
5	.819	8.187	67.238						
6	.748	7.480	74.718						
7	.716	7.158	81.876						
8	.668	6.676	88.552						
9	.639	6.391	94.943						
10	.506	5.057	100.000						

Extraction Method: Principal Component Analysis

From Table 6, it could be implied that the Eigen value table is divided into two sub sections, i.e., Initial Eigen values, Extracted Sums of Squared Loadings, and Rotation Sums of Squared Loadings. For analysis and interpretation purpose, it is important to consider the extraction and rotation sum of squared loadings. Considering Table 7, two factors are determined with relatively large Eigen values. Consequently, the first factor accounted for 29.12% of the variance and the second for 11.96 % of the variance in students' intrinsic motivation than any single observed variable. However, the remaining variables are not significant.

Table 7 :**Component Matrix output for intrinsic motivation variables**

Variables	**Component**	
	1	**2**
Understand oneself better	.464	-.421
Exploring new ideas	.507	.101
Challenging oneself	.562	-.158
For personal growth and development	.501	.476
I love learning	.456	-.159
To help others	.631	.172
To contribute to the society	.659	-.171
To solve societal problems	.625	-.104
To improve the world situation	.664	.176
To be more useful to the society	.024	.795

Extraction Method: Principal Component Analysis

2 components extracted

As observed in Table 7, the un-rotated factor loadings for all the factors using the principal component method of extraction, two factors have been identified with Eigen value greater than 1. Since factor loadings can be interpreted like standardized regression coefficients, one could say that the variables, such as improving the world situation (0.664), contributing to society (0.659), helping others (0.631), and solving societal problems (0.625) have strong correlation (factor loadings) respectively with factor 1, together (all in all) indicating *supportive behavior*.

Similarly, challenging oneself (0.562), exploring new ideas (0.507) and for personal growth and development (0.501) has moderate correlation (factor loadings) individually with factor 1 designating together *personal development*. On the other hand, being more useful to society has a very strong correlation /factor loading (0.795) with factor 2, which shows *supportive behavior*.

Nevertheless, to determine or identify the factor that explains more variance in the three categories, a varimox rotation simplifies the loading and allows easy interpretation of the factor loadings.

Table 8 Rotated Component Matrix output for the intrinsic motivation variables

Variable	Component	
	1	2
Understand oneself better	.592	-.205
Exploring new ideas	.427	.292
Challenging oneself	.578	.075
For personal growth and development	.274	.635
I love learning	.482	.032
To help others	.513	.406
To contribute to the society	.673	.102
To solve societal problems	.616	.150
To improve the world situation	.542	.422
To be more useful to the society	-.290	.740

Extraction Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalization

a. Rotation converged in 3 iterations

Un-rotated factor loadings are often difficult to interpret. As presented in Table 8, Factor rotation simplifies the loading and allows us to more easily interpret the factor loadings. In these results, a varimox rotation was performed on the data. Using the rotated loadings, the factors can be interpreted as follows:

a. Contributing to society (0.673), and solving societal problems (0.616) have large positive loadings on factor 1. On the other hand, challenging oneself (.578), and loving for learning (0.482) have moderate positive loadings on factor 1. Thus, this factor describes students' learning to be useful to society (*Supportive behavior*).

b. To be more useful to the society (0.740) and for personal growth and development, (0.635) have a positive loading on factor 2 respectively, thus, indicating *supportive and personal development behavior.*

From our culture context, we know that families live together supporting and sharing to one another and students have been developing this experience since their childhood. As a result, such supportive variables belonging to altruism were strongly selected by agreeing and/or strongly

agreeing most by the sample students, whereas some of the self-exploration variables were selected next. That is why a large positive loading is observed both on factors 1and 2.

3.4. Results of the Multiple and Stepwise Regression Analysis

To answer the third research question that was concerned with determining the predictive capability of the factors was more important in explaining the variation in students' achievement, which is defined in terms of CGPA and denoted by Y. Step-wise regression analysis was carried out as follows:

Table 9a Final summary of regression onY (n= 392)

Sources of Variation	Sum of square	df	MS	F- value	p	R^2
Regression	1.244	1	1.244	4.143	.042*	.010
Residual	117.434	391	.300			
Total	**118.679**	**392**				

a. Dependent Variable: The cumulative GPA (y)

b. Predictors: (Constant), Supportive behavior

*P<.05**

Analyzing the result in table 9a, a multiple correlation index of .010 was observed between student's CGPA (y) and students' supportive behavior (factor 1) for the total sample students considered.

The independent variables "contributing to society", "solving societal problem", "challenging oneself", and "love of learning", in combination, explained about 1% of the variance in students' academic achievement(y). The portion of variance accounted in the criterion measure due to per supportive behavior of students is statistically significant $\left(F_{(1,391)} = 4.143, p < .05\right)$.

Table 9b Summary of Stepwise regression results of the independent variables on CGPA

Variables	B-Coefficients	Beta	t- values	R	R^2	F change	P Value
Constant	2.439		22.028*				.000*
Factor 1 (supportive behavior)				.102	.010	4.143*	.042*
Challenging oneself	.054	.104	2.062*	.104[a]	.011	4.251*	.040*
I love learning	.030		0.576				. 565
To contribute to society	.071		1.319				. 188
To solve societal problem	.004		.081				.935

a. Predictors: (Constant), Challenging oneself

b. Dependent Variable: The cumulative GPA

*c. P<.05**

As indicated in Table 9b, the magnitude of beta weight of each predictor variable to the prediction of the criterion measure (CGPA), the t-value of " I attend university to challenge oneself", indicates that it significantly contributes to predict CGPA (t_{392}=2.062, p< .05). However, "---I love learning (t_{392}=0.576, p >.05), "---to contribute to society" (t_{392}= 1.319, p> .05) and "--to solve societal problem" (t_{392} = .081, p > .05) did not significantly contribute to predict the students' academic achievement (CGPA).

Regarding to the proportion of variance accounted, "I attend in the university to challenge oneself" accounted significantly for about 1.1% of the variance in students' CGPA, from the ANOVA test ($F_{(1, 391)}$ = 4.251, p<.05).

Table 10a Final summary of regression on Ɣ (n= 392)

Sources of variance	Sum of Square	df	MS	R^2F	Sig.
Regression	1.861	1	1.861	022* 4.304	.014[b]
Residual	116.818	391	.299		
Total	118.679	392			

a. Dependent Variable: The cumulative GPA

a. Predictors: (Constant), supportive &personal behavior

*b. P< .05**

Analyzing the result in table 10a, a multiple correlation index of .022 was observed between student's CGPA (y) and his/her supportive and personal behavior for the total sample students considered. Factor 2, (supportive & personal behavior) explained about 2.2% of the variance in students' academic achievement(y). This portion of variance accounted in the criterion measure due to the combined effect of "---to be more useful to the society" and one's interest "for personal growth and development" of students is statistically significant. The F-value, R^2= .022,$\left(F_{(1,391)} = 4.304\ p < .05\right)$ shows that the two predictor variables taken together under factor 2 makes a statistically significant contribution to the prediction of students' achievement in science learning.

To see the relative importance of each predictor variable, a stepwise regression was employed and beta values were determined in Table 10b below.

Table 10b Summary of the Stepwise regression results of the independent variables on CGPA

Variables	**B-Coefficients**	**Beta**	**t- values**	**R**	**R^2**	**F change**	**P Value**
constant	2.411		23.324*				.000
Factor2(supportive &personal behavior				.147[a]	.022	4.304*	.014
For personal growth and development	.060	.125	2.496*	.125	.016	6.228*	.013
To be more useful to the society	-.032	-.078	0.576				.125

a. Predictors: (Constant),personal growth and development

b. Dependent Variable: The cumulative GPA

*c. P<.05**

As observed in Table 10b, the stepwise multiple regression analysis was employed to identify an independent variable that explains the proportion of variance in the dependent variable. As a result, the variable that states "I attend in the university for personal growth and development" significantly predicted and explained about 1.6% of the variance in the criterion measure (CGPA), the F-value, R^2= .016 , $F_{(1,392)}$ = 6.228., p<.05).

To assess the relative importance of a predictor variable in predicting the criterion measure the calculated t-value for personal growth and development is statistically significant, (t_{392} = 2.496, p< .05), while the t- value computed for the variable that states " I attend in the university to be more useful to the society" was not statistically significant (t_{392} = 0.576, P>.05). This indicates that it does not contribute to the prediction of the students' CGPA.

4. Discussion

The main purpose of the study was to examine the degree of correlation between student's motivation and their effect on academic achievement (CGPA). Besides, it was set out to find out adequate evidence regarding the validity of each independent variable relative to CGPA achieved in the science courses.

In the study, to ensure the reliability of the item scales for measuring the intrinsic and extrinsic motivation of students, a pilot study was conducted. As a result, the extrinsic motivation items were discarded due to low indices of reliability, whereas those items in the intrinsic motivation were used to collect the required data since they satisfied the minimum reliability indices. To this end, the first research question chiefly addressed the determination of the degree of correlation between intrinsic motivation variables respectively with the criterion measure.

Assessing the correlations found, it could be realized that students' self-exploration variables positively and significantly correlated with altruism variables. However, in relation to students' academic achievement (CGPA), except for one variable (i.e., attending the University for personal growth and development which correlated significantly with CGPA($r=.078$, $p<.05$)), all the other variables did not correlate significantly. Besides, all the variables of altruism didn't correlate significantly with the criterion measure (CGPA). Perhaps this finding is consistent with the finding in a study conducted in Malaysia and Hong Kong in which GPA negatively but non- significantly correlated with intrinsic motivation (Abu Bakar et al., 2010; and Moneta and Siu, 2002). It implies that the more a student is intrinsically motivated, the lower will be his or her GPA and the converse also holds true. On the other hand, these results disagree from those studies conducted by (Remali et al., 2013, Skaalvik, et al., 2006 and 2004, Broussard, et al., 2004; and Sandar, 2002), which emphasized that a significant relationship prevails between academic performance and motivation.

Such low and non- significant correlations between the intrinsic motivation variables and students' CGPA might be associated with restriction in the range of variability in both cases. Since Likert scale produces ordinal data, median values for averages and interquartile ranges for dispersions were computed. As a result, for the intrinsic motivation variables, the interquartile ranges calculated not varied this much between them because about seven items have equal IQR of 1.00, which indicate a small dispersion from the median values determined. Most of the sample students rated the majority of the items in the questionnaire by agreeing or strongly agreeing. You can imagine that with negatively skewed values the range will be small. This condition shows restriction on the range. Moreover, you can still see the range of restriction (0.49-0.50) in the criterion measure (GCPA). As a result, the correlation coefficients obtained were small and could not be statistically significant. Furthermore, the influence is found to be high on the predictions.

The third research question focused on determining the combined effect and relative contribution of each independent variable to the prediction of students' CGPA (Y).To answer this question, a step-wise regression model and exploratory factor analysis were carried out to reduce the number of variables into fewer ones of relevant factor (s) that can be used as an index of all variables, for further analysis. Consequently, supportive behavior as factor 1 and supportive and personal behavior as factor 2 were identified out of the 10 variables respectively.

Analyzing the validity coefficients determined in Tables10a-b, to the maximum prediction of students' academic achievement (Y's), the step-wise regression analysis identified *supportive behavior* as the sole factor to predict the criterion measure (CGPA). "Challenging one-self", "love of learning", "contributing to society" and "solving societal problem" in combination explained about 1% of the CGPA (Y) variance for the entire sample studied. It may be suggested that a linear combination of these selected predictor variables look to have a reliable relation with student's academic achievement (Y) and contribute to the accuracy of prediction, though the proportion of the variances accounted was extremely low.

Considering the relative importance of each selected independent variable to the prediction of the criterion measure (Y), only "I attended in the University for challenging oneself" accounted for the variance in the criterion measure (Y). This could mean the variable challenging oneself has positive influence on students' academic performance or students motivated to challenge themselves on different tasks seem to get better scores.

Similarly, evaluating closely the summary of the regression result in Tables 10a-b, it could be confirmed that "attending the university to be more useful to society" and "attending university for personal growth and development" combined and significantly contributed a 2.2% variation in CGPA. But, "--- for personal growth and development" came out as the single predictor variable selected in the model in relation to the criterion measure (CGPA) than the other independent variable. So, it seems that students motivated for personal growth and development via self-exploration have the ability to perform well academically.

Even though the predictive power of "-to challenge oneself "and "-for personal growth and development" determined with respect to CGPA are low, this finding agrees with past research findings, which explain intrinsic motivation components are positively related to academic

achievement (Amare, 2014; Kostelecky, *et al*. 2005; Kamauru, 2000; Ryan and Deci, 2000; Dev., 1997; Bomia, *et.al*., 1997; and Lepper, 1988). The point is, such types of students are more likely to complete a chosen task and keen to challenge the activity and strive for personal development. The inadequate predictive power of the elements of the intrinsic motivation to predict CGPA might be associated with the following reasons:

- Restriction of range was observed in the CGPA. The standard deviation for the criterion measure was 0.55 for the total group. This implies that the range of ability among the sample subjects considered is restricted and has effect on the coefficients determined.
- Students' responses for the items in each scale with regard to their motivation toward science courses could appear to be partly not genuine or may not represent their real behavior.

5. Conclusion and Implications

5.1 Conclusion

It was obvious that low correlations are observed between students' intrinsic motivation and academic achievement as measured by CGPAs to the entire sample subjects studied. Even if the low correlations determined might have occurred due to the restriction of range of scores in the independent variables (Self-exploration and Altruism) and dependent variable (CGPAs), it may be still concluded that students' interest and preference towards the Applied Science Courses seem to be not strong. It appears difficult to say that they are learning science courses with interest and being delighted. Besides, not being placed with their preferences in the different departments of sciences could have its own influence on their motivation and performances.

On the other hand, improved prediction of student's performance was not strongly made within the selected combination of self-exploration and altruism variables. Apparently, the portion of variances (1.1% -1.6%) that contributed to students' achievement as explained by the independent variables is relatively very small. Both data signify that a large portion (98.4% - 98.9%) of the variance in the criterion measures (Y) was unexplained. This condition might have occurred as a result of the restriction of range of scores observed in the independent variable and dependent variable. These statistical conditions perhaps could be expounded as follows.

Examining the responses of students to items in the questionnaire, they fall on "strongly agree" and/or "agree" to most of the items. It implies that there is no an even distribution of scores from

strongly disagree to strongly agree. The scores are, therefore, leaning to one direction indicating narrower distribution of scores and it is also negatively skewed graphically. As a result, due to such restriction of range of scores in both the independent variable (intrinsic) and criterion measure (CGPA), low predictive validity coefficients have been observed. However, this condition may signify to us to look the situation from different angles. On the one hand, to replicate the study in other groups and learning situations and combining for other psychological factors that encourage and initiate students' performance. Moreover, it is important to orient and synthesize sample subjects to fill out the questionnaire genuinely.

Most importantly, it is also decisive on the part of teachers to be loyal to their profession, creating opportunities to enhance students' motivation to be successful in their science learning by challenging students setting tasks at a moderate level of difficulty so that they regularly experience success, using novel experiences to arouse curiosity, modeling abstract ideas in concrete ways, and creating a conducive learning environment with adequate resources.

5.2 Implications

Based on the research findings and conclusions made, the following implications could be made.

1. In this study, students' intrinsic motivation (self-exploration & Altruism) towards learning Applied Science Courses does seem to be a direct factor that can influence students' academic achievement (i.e., CGPA), though very low validity coefficients were determined and the proportion of variance they accounted on the criterion measure (CGPA) was that much less due to the statistical reasons mentioned earlier. Yet the results of this study suggest to promote the personal and supportive behaviors, the interest to challenge oneself and the need for personal growth and development are important intrinsic factors to enhance students' academic performances.
2. It may be worthwhile to improve students' intrinsic motivation towards science learning through organizing a variety of stimulating activities in the instruction process. More specifically, creating classroom situations that encourage real-world activities to easily understand the subject matter is vital. Above all, providing honest and informative feedback and imparting students how they can learn inspire their intrinsic motivation, which in turn are decisive for their learning.

3. Teachers' commitment and dedication to create conducive learning environment, give students options, use varied active learning methods, and provide activities that are appropriately challenging in the classroom are decisive to improve students' motivation and engagement in their learning.
4. Though it is stipulated that students are placed into the field of their choices on a competitive basis using their preparatory grades, (article 72, Senate legislation, 2017), still a student coming to a new environment, may not be effective in making appropriate choices unless they get adequate orientations and feedbacks. Thus, a decisive role should be played by guidance and counseling office in collaboration with faculties and departments in providing the necessary academic advices, guidance and assistance to help students make informed decisions to place themselves to the different fields of studies on the bases of their selection and preferences rather than being imposed by administrative decisions.
5. Essentially, this study proposes further study in the future on intrinsic and extrinsic motivation variables including other psychological factors on wider sample and on those students who are specializing in social science and other fields.

6. Limitations of the Study

The study was confined to a single university; hence, the results may not necessarily apply to students in other institutions. On the other hand, this study focused on investigating specific motivational factors (intrinsic and extrinsic motivation) that may influence student's achievement in higher learning. However, there are varying psychological factors (i.e. motivation, self-efficacy, attitude, learning strategies, learning values, learning goals, performance goal, self-regulated learning, effort, learning environment, etc.,) that influence students' academic achievement, but not treated in this study. Thus, such limitations should be considered before making any form of generalization based on the results of the study.

This study of course has its strength. It has identified two relevant personal internal factors (i.e., the need to challenge oneself and the interest for personal growth and development) that are exhibited by persons with high need for achievement. A person, who has high need for achievement, urges to excel, strives for excellence, struggles for success, considers problems as challenges to be met, strong need to accomplish a task to a set of standard, and personal conviction of being in charge of one's own fate (Rybnicek, et al., 2019, McClelland, et al., 1953).

Declaration of Conflicting Interests

The author declares that no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Original Article

Improving Selected Electrical Engineering Students' Abilities of Using Technological Tools

Ermias Kassahun

Department of Electrical and Computer Engineering, Gondar, Ethiopia

Email: ermiascachi7565@gmail.com

Abstract

This article deals with the effects of using technological lab tools, specifically inverting and non-inverting operational amplifiers, on improving the abilities of 3rd-year Electrical Engineering students at the University of Gondar, Ethiopia. It has cultivated a culture of continuous improvement and collaboration of eighteen students who were grouped into three teams. The performance of students' ability was evaluated using tests, attitude and creativity measurements. The tests were administered just to measure the students' knowledge and skills before and after the intervention. Besides, questionnaire was employed in order to measure overall use of electronics lab tools during the actual training sessions. Gaps or issues on two applied electronics lab tools were seen with respect to the current curricula and instructional strategies, student performance and understanding, motivation and involvement of students, comments from both teachers and students. On the other hand, students were supposed to relate and blend their theoretical knowledge with practical abilities when they access to exchange practical skills. Towards this end, they were guided to do the same design circuit across groups. Empirical data were gathered from peer assessment, observation, and pre- and post-tests were described descriptively considered time. The findings indicated a significant improvement in students' comprehension and performance when utilizing technological tools during electronics lab training periods. The implementation of inverting operational amplifier improves the test score of the student by 41.11%. There was an increase in both technical proficiency and problem-solving skills among the participants.

Keywords: Amplifier, Circuit, Electronics Lab

1. Introduction

Today, in a rapidly evolving world, technology has become an integral part of our daily lives. It paves the way for various advancements in education, including the incorporation of technological tools to enhance learning experiences. Since education is a social activity, teachers who spend a lot of time getting to know their students directly associated with higher levels of educational quality. On the other hand, opportunities for students would be visualizing, analyzing, and discussing ideas in groups to enhance the quality of instruction. More student-centered learning environments result from the incorporation of modern technologies into courses of study.

During the information age, electronics lab tools should motivate students by making their lessons more real-world experiences and bringing them into the 21st century (Kolesnikova, 2016). Employing technology in the classroom has become essential to educating students for the needs of a rapidly changing technological environment. In section two, a third-year Electrical Engineering student investigates the usage of inverting and non-inverting operational amplifiers. The Electrical Engineering department recognizes the need to provide students with practical experience that bridges the gap between theoretical knowledge and practical applications. In these regards, inverting and non-inverting operational amplifiers are fundamental components in analog circuit and hence they are essential for future electrical engineers.

Then, teachers need to meet the expectations of the students; effective teaching and learning involve the use of various methods and approaches. Due to the complex, numerical, and heterogeneous character of electrical engineering education in particular, effective teaching strategies must be used to improve student performance (Kuo, 2015). Since the world is moving rapidly into digital media and information, the role of technological lab tools in education is becoming more and more important. Effective use of technological tools like computers, simulation software, hardware tools and others for education can enhance the quality and accessibility of education, standard, learning motivation and environment. Improving the abilities of selected Electrical Engineering students using technological lab tools can empower them to become adept problem solvers and innovative thinkers. This initiative aligns with the evolving landscape of Electrical Engineering, ensuring that students not only graduate with theoretical knowledge but also possess the practical skills (Rahman *et al*., 2012).

Ultimately, the goal is to cultivate a cohort of graduates who are well-prepared to contribute meaningfully to the advancements and innovations in Electrical Engineering. The overarching principles and educational theories that support the idea of improving 3rd year Electrical Engineering students' abilities are possible through the use of technological lab tools. Here are some theoretical perspectives that lend credence to this initiative, such as experiential learning, simulation and modeling, and active learning strategies. By integrating these theoretical principles, educational institutions can build a robust framework for improving the abilities of electrical engineering students (Koretsky & Magana, 2019).

Impact of technological electronics lab tools is addressed in this paper. In actuality, using the lab equipment directly wasn't encouraged by the conventional teaching method. In these regards, there are many other factors that prevent all students from taking practical classes in the same way. For instance, lack of willingness to participate in practical classes, lack of sufficient laboratory facilities, and lack of readiness of teachers to teach practical classes. Similarly, previous studies in 3rd year Electrical Engineering education have explored various methods to enhance students' skills with technological electronics lab tools.

The following are research questions which are addressed in this paper. These are

1) What traditional approaches were employed just before the research began?

2) What are the problems experienced by teachers and students regarding technology use in their classroom, if tools are available? If not available, what is the department is / doing to install tools?

3) What kind of support do teachers and LAB assistants need to make productive use of technology in the classroom?

4) What are the views /efforts of teachers and LAB assistants in participation and support for increasing technology use in course curriculum or study?

The objective of this study was, therefore, to enhance the impact of technological electronics lab tools on improving selected Electrical Engineering students. The novelty of this paper was tailored learning paths, collaborative practical based learning and continuous feedback from 3rd year

electrical engineering students. The contribution and practical implications of this study was by addressing specific student groups and personalized learning.

2. Review of related works

Incorporating the learning styles of students in the teaching process makes learning easier for students to enhance their interest and understanding (Raiyn, 2016). The implementation of educational technology and the utilization of Information communication technology (ICT) are important components in a higher education institute (Seitebakeng, 2018). There have been shortcomings in the development of accommodations for students with learning disabilities using assistive technology. A study on the micro level, following the progress of six students who had some form of a learning disability (Floyd & Judge, 2012). The study was completed through the use of a piece of technology called classmate reader.

There is a common situation where most of the staff members have awareness and access to it. However, author finding come with some doubt that the awareness of the staff members does not guarantee the integration of ICT into the teaching-learning system. A reading and comprehension passage was given to all students. Students were then asked to test using traditional pen and paper methods, followed by a second assignment completed using the classmate reader. The results showed that the use of assistive technology is effective support and accommodation for students with learning disabilities.

In a use of technology in the classroom to strengthen inclusion of all types of learners, a variety of ways that technology can support inclusive practice (Bourdeaux, 1981). For instance, mobile technologies can provide an authentic and meaningful learning experience. Audio visual (including video conferencing and presentation software) media not only provide an authentic and meaningful experience, but they also foster a sense of community.

Practical works improve students' understanding, their problem-solving skills, and nature of science by having them duplicate the actions of scientists (Shana & Abulibdeh, 2020). According to the Shana and Abulibdeh, students should behave like scientists and adhere to scientific procedures when solving a scientific subject. Developing accurate observations and descriptions, turning ideas into real-world applications, keeping students interested in research, and encouraging a rational and acceptable way of thinking are some of the motives identified in (Sofoklis *et al*., 2017). These

authors investigate the positive impact of technology tools on student's knowledge. They recommend that technology-aided education must be installed in classrooms to bring about an overall quality of education. Blended learning could be enhanced by technology (Creswell & Creswell, 2018). These authors describe distance learning and made group instructions through technology and in-person interaction.

Teachers need to be cautious when evaluating the efficiency of technology integration and carefully select appropriate learning programmers. Learning technologies offer an unparalleled chance to enhance education, facilitate personalized learning, and promote greater involvement and wider educational opportunities (Erduran, 2018). Erduran described that learning technologies are resources and tools created especially for the use of combined instructional. In this study unexpected finding can be considered as divergent skill levels, influence of self and group learning and implications for curriculum design.

The traditional teaching (lecture) method is very common in education especially at university level. In this education context, the educator can deliver the message via the "chalk-and-talk" method, uniform curriculum and overhead projector transparencies. Traditional surveys and questionnaires are often used to collect quantitative data on students' abilities and experiences with technological tools.

3. Research Methods

The current study addresses challenges faced by selected 3rd year Electrical Engineering students. In the first place, to assess the problem, sample groups were selected and questionnaires were prepared and distributed to them. In the modern era of world education, many innovative technological lab tools like electronics lab are available for teachers to use in their classrooms. Professional practical training must be provided and continuously encouraged by stakeholders for implementation of electronics lab tools. Teachers are required to integrate technology into their classrooms. This improves student test scores and overall students' performance during practical time. All interventions cab be considered group learning styles, prior knowledge levels, and specific challenges faced by the target group (Kuo, 2015).

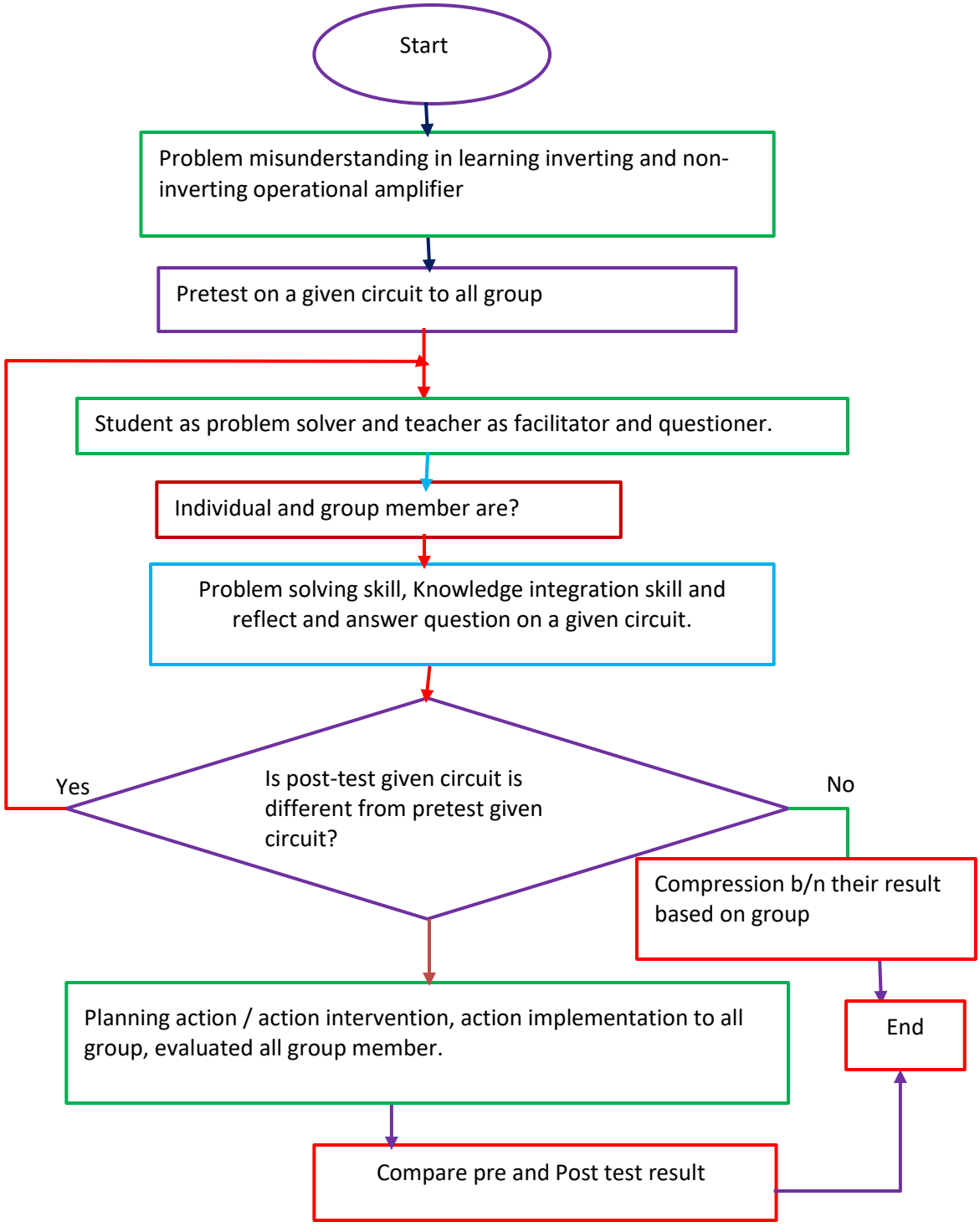


Figure 1: System model for conceptual framework of the study

Designing, implementing, and evaluating an approach to improve selected Electrical Engineering students' abilities with technological lab tools involves a systematic and well-structured process.

Some ways of designing approach are technological lab tools, training, integrate real-world applications into the curriculum, continuous feedback, pre-and post-assessment.

The validity and reliability of electronics lab tools improves the characteristics of the selected students. Implementation of the intervention across different sessions and groups, training sessions, use reliability of feedback mechanism and continuous monitoring is described as Figure 1. The designed system was to identify students' misconception regarding inverting and non-inverting operational amplifier using problem-based learning.

This research involves reflection, planning, observation and intervention implementation. Using group discussion method, the students encourage how they are communicating and integrate with each other and find new ideas with existing ideas.

3.1 Data Sampling and Gathering techniques, and procedures for selecting participants.

The gaps that initiated the current investigation were considered current curricula and instructional strategies, student performance and comments from both teachers and students. This action research was conducted on electronics lab courses within three months. Experimental data can be controlled and managed in the form of data collection, quantitative data, qualitative data, post-intervention assessment, data interpretation and peer review for each group.

Eighteen participants were chosen based on their grade points in all categories, including sex, age and academic field. Pre-and post-tests were administered before and after the intervention. The tests consisted of circuit analysis problems related to inverting and non-inverting operational amplifiers. The considerations to make productive use of electronics lab tools were supposed to support of professional development, technical assistance, access to resources, curriculum development assistance. The questionnaires were prepared in English and the respondents could respond to answer based on the given questions. The survey questionnaire was distributed among the participants to gather their perceptions and experiences regarding the use of technological lab tools. The data collection in this inquiry used is 18 students. The analysis was carried out using assigning labels, group discussions, pre- and post-intervention assessments and comparative analysis. Time and percentage were utilized by three groups of students to evaluate the characteristics of the responses as shown Table 1. The number of students in a group and the quantity of practice time

are two selected input parameters that have a significant impact on how well students complete their practical skills.

Table 1 Input parameters and Levels

Input parameters	**Levels**
Time elapsed on practice (hr.)	2
Number of students in a group	4
	6
	8

3.2 Intervention plan and implementation of the designed project

Conducting an intervention to improve 3rd year Electrical Engineering students' abilities by using electronics lab tools involves a systematic approach. Designing and implementing an intervention can in the form of select electronics lab tools, implement training sessions for each group, group collaboration, continuous feedback and evaluation (Mustapha *et al*., 2014). Data analysis for this study was conducted through both qualitative and quantitative approaches. The combination of both in a study on Electrical Engineering students' abilities with technological tools provides a comprehensive understanding of the research questions. The analyses were carried out using conducting one to one or group interviews with selected students, questionnaires and direct observations of students during intervention activities.

Qualitative study uses face-to-face interviews as electronics lab tool to collect students' narratives on how they improve their knowledge using practical teaching methods. The three scenarios and main strategies in the class can be considered based number of groups. The first scenario was four students in one group, the second scenario was six students in one group and the last scenario was eight students in one group. Some of the conducting intervention implementation issues are to control and identify a group of students for the practical work. The interventions involved incorporating inverting and non-inverting operational amplifiers under electronics lab course. Each group member chooses one student to participate in a thorough lab practice. Individuals were responsible for reporting training-related feedback and transferring information to a group member. The distribution of respondents was based on time used. Total number of participants can be

considered as input parameters to create a variety of groups. Analysis of the effects of time and number of students in three respondents' group can be tested as shown in Table 2.

Table 2 **Distribution of Respondents**

Time (hr.)	2	2	2
Number of students	4	6	8

4 Results

As the first part of analysis, the data of participants' performance was collected and number of descriptive results can be expressed as poor, good, very good and excellent. The simulation result was collected based on closed ending questions particularly from students. The result was plotted based on the questioner's answer which is illustrated in Table 3.

Table 3 Students response on the Likert Scale result in count

S/No	Issue	Strongly Agree	Agree	Disagree	Strongly Disagree
1	I would benefit from additional training on electronics lab practical skills.	10	6	2	0
2	I believe that practical learning will promote my further employment opportunities.	16	2	0	0
3	There are necessary electronics lab tools and equipment for studies.	12	4	2	0
4	I struggle to apply the theoretical knowledge I learn in class to practical experiments.	8	6	2	2
5	The time allocated for practical learning is appropriate.	0	4	10	4
6	I am confident in my ability to complete practical tasks.	2	3	8	5
7	I knew what I was supposed to learn during the practical learning period.	8	7	3	0

8	My practical learning period helped me to improve my learning achievement.	10	6	2	0
9	I was satisfied with my practical learning period	3	8	5	2
10	I received sufficient guidance at the workplace for my practical learning difficulties.	3	9	6	0
11	I am able to work effectively in a team when performing laboratory experiments.	8	6	2	2
12	I am motivated and engaged when completing practical assignments	10	5	3	0
13	I believe that number of students in a group limit my practical performance.	12	5	0	0
14	I believe that student group formation based on their grade is important	11	6	1	0

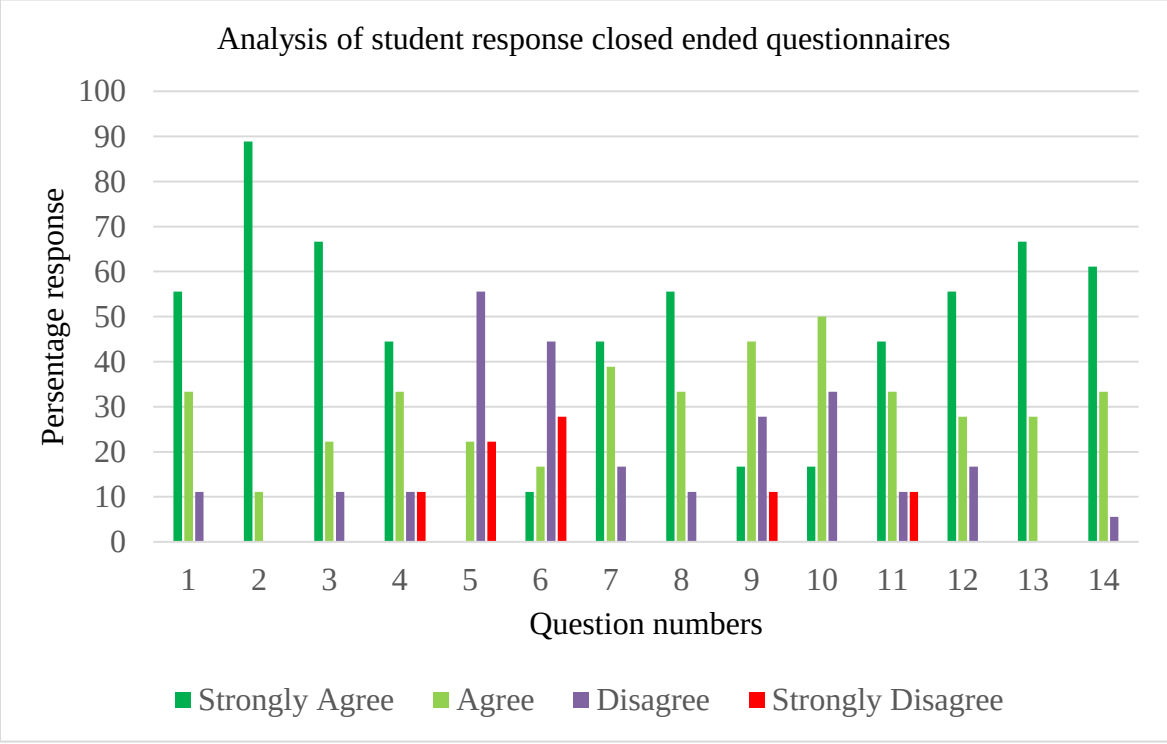


***Figure 2*: Student response closed ended questionnaires**

Figure 2 illustrates that 88.89% of the respondents strongly agree and 11.11 % of student respondents agreed that practical learning will promote their further employment opportunities.

This helps improve their knowledge of practical skills and improve their productivity in their workplace during practical time. 66.67% of the respondents is strongly agree and 27.78% of s students is agree. The number of students in a group limits my practical performance. It is concluded that there are electronic lab tools and equipment for studies, time allocated for practical learning is inappropriate.

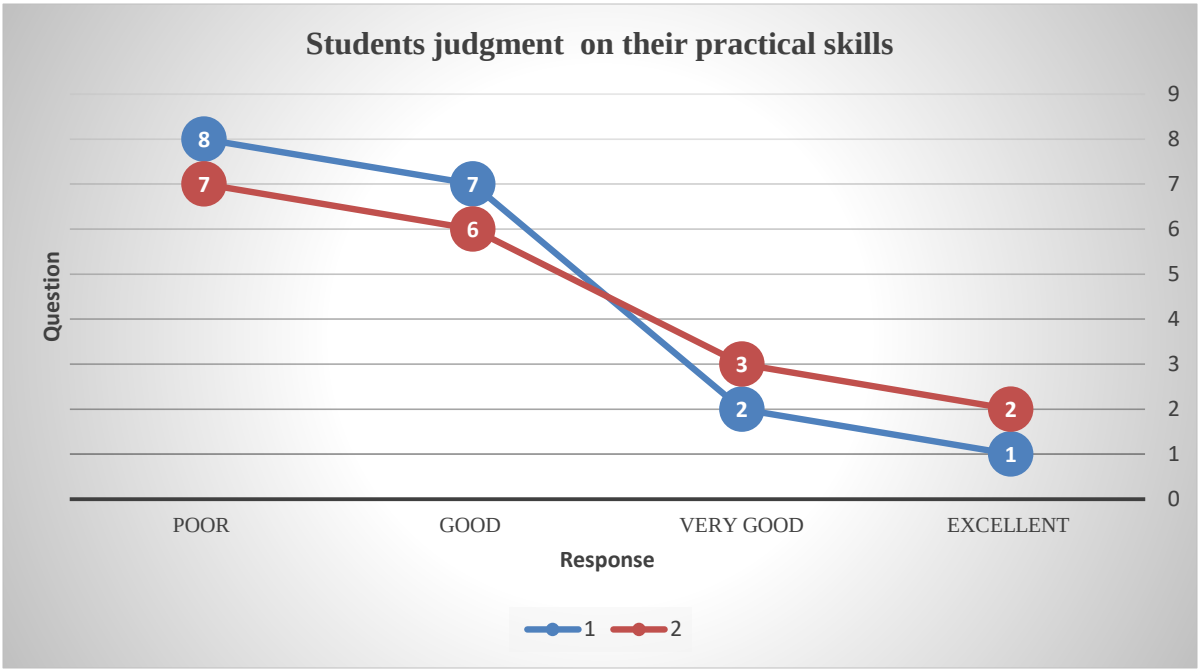
This implies that the number of students in a one group is higher and lack confidence during practical work. Table 4 shows that analysis of data can be interpreted as interims of poor, good, very good and excellent results. This result can obtain based on questionnaire as they filled from appendix part instruction II. As shown in Figure 3 below, the result describes the judgment of students on their own practical skill and the redness of the obtained result is low.

Table 4 Interpretation and analysis of data obtains from instruction II

Q no.1	Poor	Good	Very good	Excellent
Count	8	7	2	1
100 %	44.44	38.89	11.11	5.56
Q no.2	Poor	Good	Very good	Excellent
Count	7	6	3	2
100 %	38.89	33.33	16.67	11.11

Table 4 can be illustrated, just alternatively, as follows:

In addition, the forthcoming figures (Figure 4 and Figure 5) show electronic lab circuit which is given to students before and after intervention respectively for practical purpose. Ensuring the validity and reliability of an assessment tool is crucial to obtaining meaningful and accurate results. Evaluating Electrical Engineering students' abilities can be in the form of content validity, subject matter experts, pre and post test and continuous review and revision. The evaluation of study in each group takes a project to find the output values of practical skills based on given input parameters. Implementing inverting and non-inverting operational amplifiers before and after



intervention is given to same circuit to all group. The students can be contributing existing body of knowledge with integration of theory and practice.

***Figure 3*: Students judgment on their own practical performance**

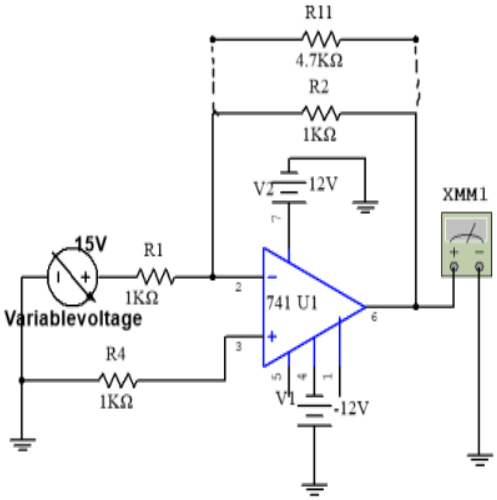


***Figure 4*: Given circuit before intervention**

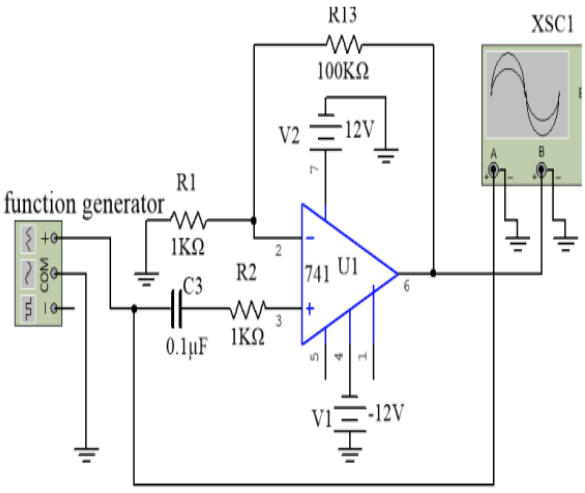


***Figure 5*: Given circuit after intervention**

Below are reports on strategy-based groups of students in from of three scenarios. The first scenario was eight students in one group. Hence, the group of students gave a poor performance. The second

scenario was six students in one group which medium result they obtained, and the last scenario was four students in one group, which is highest score they obtained.

Scenario One: Poor Performance

According to evaluation criteria, a group of eight students can get a poor result during their practical work. This is due to insufficient measurements, quick operations, lack of confidence, and poor communication between measurements. A single student may have an excellent suggestion, but many students cannot pay attention. This implies interaction and misunderstanding of their work. The evaluation and supplied data are assembled as shown in Table 5 below.

Table 5 The evaluation and supplied data for group 3

Evaluating characteristics	Expected result for inverting and) data	Student's data (For inverting)	Expected result for non-inverting and) data	Student's data (For non-inverting)	Reasons to failure
Output (V) before intervention	-3	-2	3	2	Poor measurement.
Output (V) after intervention	-3	-2.7	3	2.7	

Scenario Two: Medium Performance

In this scenario as shown in Table 6, a group of six students produces their practical work and hence the success of fishing and answering questions was considered as medium level and good. This shows the number of students one group is minimum compared scenario one. This is because different students contributing ideas during practical time and construction of the circuit becomes better than the scenario one.

Table 6 **The evaluation and supplied data for group 2**

Evaluating characteristics	Expected result for inverting and) data	Student's data (For inverting)	Expected result for non-inverting and) data	Student's data (For non-inverting)	Reasons to failure
Output (V) before intervention	-3	-2.4	3	2.4	Poor measurement and equipment usage
Output (V) after intervention	-3	-2.8	3	-2.8	

Scenario Three: Best Performance

The last scenario as shown Table 7, illustrates that how a group of four students perform the best output voltage measurement and they achieve maximum result. The best result is each group member having access to operate and communicating easily. Even though it is against the rules of this course to work alone, this group makes progress and works well together. One member takes measurements, and the other members offer a straightforward evaluation from various angles. Feedback and ideas were openly exchanged, and there was sufficient time to decide on an adjustment to the measure of output compared to scenario one and two.

Table 7 The evaluation and supplied data for group 1

Evaluating characteristics	Expected result for inverting and) data	Student's data (For inverting)	Expected result for non-inverting and) data	Student's data (For non-inverting)	Reasons
Output (V) before intervention	-3	-2.7	3	2.7	Good usage of steps to

Output (V) after intervention	-3	-2.97	3	2.97	measure the outputs.

Table 8 below shows the test result before and after implementation of the circuit. There was a significant difference of students' achievements between the first, second and third group and the results reached their saturation point in the third group.

Table 8 Test result before and after implementation

Time (hr.)	2	2	2
Number of students	4	6	8
Test (15%) before intervention	8	7	5
Test (15%) after intervention	14.5	13	11

The Figure has shown that pre and post-test results. The students' result in group one, two and three had a basic understanding of inverting and non-inverting operational amplifiers, with an average score of 53.33%, 46.67% and 33.33 % respectively. After the implementation of inverting and non-inverting operational amplifiers circuit during practical time, the post-test result shows a significant improvement, with an average score of 96.67%, 86.67% and 73.33% for group one, two and three respectively. This demonstrated the effectiveness of using inverting and non-inverting operational amplifiers in enhancing students' ability.

The analysis of pre- and post-test scores revealed a significant improvement in students' academic performance after the intervention. This means post-test scores were noticeably higher than pre-test scores. This means to enhance understanding and application of concepts related to inverting and non-inverting operational amplifiers. Finally, the survey responses indicated that the majority of students found the use of electronics lab tools beneficial in understanding complex circuit configurations. They expressed increased confidence, better visualization of concepts, and improved problem-solving abilities when utilizing these tools. Table 10 shows results before and after intervention of 15%.

Table 9 Average result before and after intervention

	G_1	G_2	G_3	AVG
Test (15%) before intervention	53.33	46.67	33.33	44.44
Test (15%) after intervention	96.67	86.67	73.33	85.56

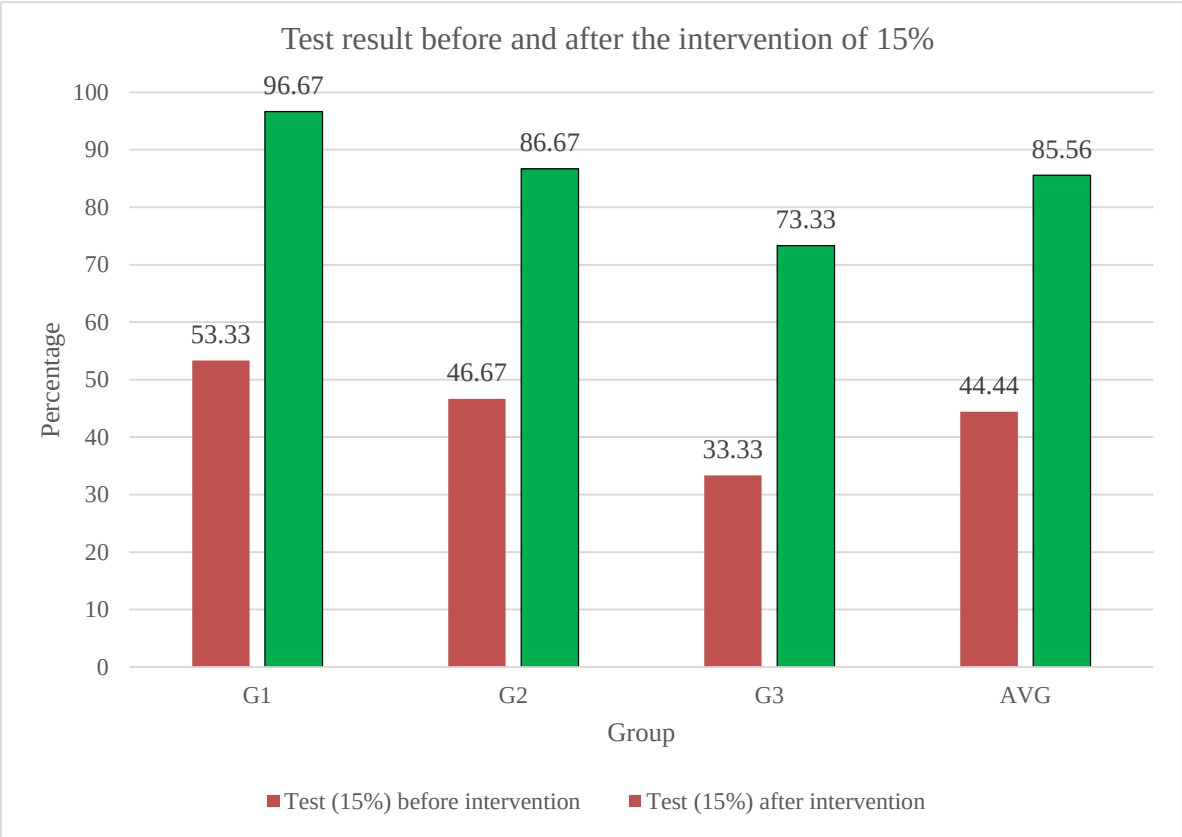


Figure 6: Test Result Before and After Intervention

5 Discussion

This study has found several main findings. The implementation of this research is to enhance the abilities of selected electrical engineering students using technological lab tools. Open-ended questions show that cooperative and problem solution aspects were the most preferred aspects in

the problem solving. some challenges arose during the research was students who refused to participate during the group presentation and time constraint. In this case, the teacher had to ask the students to continue group discussion after class end. Findings and outcomes of this study are enhanced proficiency, engagement and motivation, enhanced problem-solving skills, collaborative learning culture and continuous improvement. There was a significant difference of students' achievements between the first, second and group and the results reached their saturation point in the third round. The implementation of inverting and non-inverting operational amplifier improves the test score of the student by 41.11%. However, there are different challenges to implementing a technology-aided education system, especially the light randomly going off at particular time. This needs research to assess its impact and related limiting factor. The performance of the four, six and eight students respectively in one group is arranged. Finally, based on their performance, four groups of students have maximum points scores compared to the other group.

6. Conclusion

The findings indicated a significant improvement in students' comprehension and performance when utilizing technological tools during electronics lab training periods. The overall outcome was evaluated and measured based on the implementation of the circuit, and they were determined as having poor, medium, and best performance of the project. The implementation of Inverting and Non-Inverting operational amplifier improves the test score of the student by 41.11%. These findings indicate significant increases in both technical proficiency and problem-solving skills among the participants. Yet, there were some common limitations of traditional methods are lack of hands-on experience, limited practical relevance, inadequate collaboration opportunities and lack of proper space for having group discussion. In the future, exploring the effectiveness of specific instructional strategies, investigating the long-term impact of self-directed learning on technological proficiency, and conducting cross-institutional studies for broader generalizability could be demanded. The teachers, educational leaders and policy makers may arrange and facilitate were minimize group members for teaching method's implementation in future teachers' education.

Declaration of Conflicting Interests

The author declares that no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Original Article

Use of the agile scrum method to manage an e-learning platform in the face of the application of the ADDIE model in the pedagogical engineering of a training course

Lamya Anoir[*1], Mohamed Khaldi[2], Mohamed Erradi[3]*

*Research team in Computer Science and University Pedagogical Engineering Higher Normal School, Abdelmalek Essaadi University, Tetouan – Morocco. (*Corresponding author)*

E-mail:[1]lamya.anoir@uae.ac.ma; [2]medkhaldi@yahoo.fr; [3]erradi.mo.mo@gmail.com

Abstract

With the advent of new technologies and the changing needs of learners, however, it has become essential to explore more flexible and agile approaches to the design and management of e-Learning courses. This article examines how the agile Scrum method can be used to manage an e-Learning platform, and how it can be integrated with the ADDIE model to improve the pedagogical engineering of a training course. The two methods, Scrum and ADDIE, act on the two axes of e-Learning platform management: IT project management and pedagogical content engineering. Consequently, the aim of our work is to highlight the different issues that are taken into account when working with the agile Scrum method and the ADDIE pedagogical model, and to present an example of the application of agile methodologies in the pedagogical design of personalized, adaptive learning systems. With its emphasis on flexibility and rapid iteration, this hybrid approach aims to respond effectively to the changing needs of learners and technological developments. In this article, we present the challenges of each method and propose our approach to integrating these methods into the technical and pedagogical management of a learning platform.

Keywords: Agile Scrum, ADDIE, integration, e-Learning, pedagogical engineering.

1. Introduction

With the development of Information and Communication Technologies (ICT) continuing to accelerate, the growing and ever more demanding needs of users and a constantly changing economic context, IT projects are becoming increasingly complex. As a result, managing e-

Learning projects is becoming a delicate issue for any company, and their mastery and success are essential, whatever the size or type of project.

Digital transformation implies the inclusion and development of agile methodologies that make it possible to adapt and personalize the way of working to project conditions, achieving flexibility to the specific circumstances of the environment by working in a personalized and collaborative way (Lamya *et al*., 2021).

On the one hand, and in practice, the application of a process and management will accompany the designer through the various phases of project management, from the definition of objectives to the realization of deliverables, through resource allocation and schedule management. Among the most widely used methods are agile methods, which respond to traditional methods that are too predictive and inflexible, by introducing new, more flexible principles such as anticipation, self-regulation, feedback and collaboration. Scrum is the best-known of the agile methods. Created in 1996 by Ken Schwaber, it emphasizes the close-knit aspect of a self-organized team working towards a shared goal. Scrum's distinctive feature is that it places the end-user at the heart of the team, valuing the individual, the team, concreteness, application, collaboration and adaptation. Scrum is not an acronym but the English word for scrum in a rugby match, It's not a method in the strict sense of the word but rather an approach, a process framework and a set of principles, almost a philosophy based on change, result-oriented culture, transparency and communication, respect for users, customers and team spirit (Collignon & Schöpfel, 2016).

On the other hand, when we talk about the design of an e-Learning project we often talk about pedagogical engineering, which corresponds to a process implemented to solve a training or learning problem carried out by one or more actors driven explicitly or implicitly on the basis of principles derived from different theories, during which different tools are used to create different intermediate productions and whose end result is a learning environment proposed as a solution to the training problem. Among the models often used is the ADDIE model, in which analysis, design, development, implementation and evaluation are the successive stages in the product development process. This approach follows a regular, step-by-step process. It is currently the most widely used approach. It enables novices to follow a production path with deliverables at each stage.

Both the Scrum and ADDIE methods act on the two axes of e-Learning management: IT project management and pedagogical content engineering. They are new, more agile modes of project management that foster perceived autonomy and competence by providing the necessary tools and opportunities for self-regulated learners to adjust their learning strategies.

In the next sections, we will present our theoretical framework in order to identify our objective, and then propose a scheme that implements project management using the Scrum method and the design of a training device using the ADDIE model.

2. Materials and Methods

Our article focuses on two essential points. The first concerns the management of an e-Learning project using the Scrum method, and the second concerns the pedagogical design of an e-learning device using the ADDIE model.

2.1. Overview of e-Learning project management :

An e-Learning project is a human activity that achieves a clear objective on a timescale. It's distance learning using ICT.

The "learner" - a literal translation of "learner", a more appropriate term in this case - has all the essential elements for learning at his or her workstation. So many tools for learning alone without being isolated. Creating an e-learning course is a long, complex and energy-intensive process, involving a wide variety of participants (content experts, instructional designers, web and multimedia developers, etc.) (Reiss, 2007).

This type of project poses a number of challenges: effective coordination between team members, designing activities and materials adapted to online learning, and implementing all this on the e-Learning platform that offers MOOCs (Massive online Open Courses). It can be used in a variety of ways, including as an alternative or complement to face-to-face training. An e-Learning platform corresponds to a multi-channel digital environment, including videoconferencing, assessment, interactive laboratory and forum functions. For the pedagogical content of this model, personalized pedagogical follow-up (Lamya et al., 2020) is easy to implement.

An agile method is an iterative, incremental approach, performed in a collaborative spirit, with just the right amount of formalism. It generates a high-quality product while taking into account changing needs (Messager, 2009).

Studies show that the Agile method improves software development quality and productivity, reduces time-to-market (Reifer, 2002; Li et al., 2010; Cardozo et al., 2010) and enhances customer satisfaction (Boehm & Turner, 2003).

The Agile method is characterized by leadership, creativity and motivation of developers, technical excellence and simplicity of design, close collaboration between software developers and business teams, face-to-face communication, delivery of different parts of the software development at short and regular intervals, acceptance of changes in customer requirements during all phases of the development process in order to better satisfy the customer (Misra et al., 2009; Dingsoyr et al., 2012).

An agile method is an iterative, incremental approach, conducted in a collaborative way with just the right amount of formalism. It generates a high-quality product while taking into account evolving customer needs.

Agile methods are iterative, incremental software development models that aim to best meet the needs expressed by requesters, offering a high degree of responsiveness to their requests during development (Manifesto, 2001).

There are three roles in Scrum:

- The Product Owner (PO): is the product owner. He provides a shared vision of the product and is responsible for defining and managing product priorities.
- The Scrum Master: responsible for helping the team apply Scrum to its context, and has a duty to eliminate obstacles that may slow down the team's work.
- The Scrum team: is responsible for product development, and organizes itself to optimize its productivity and increase its skills to achieve this.
  Scrum is based on two artefacts, the pivots of activities:

- The product backlog: this is a list of "users stories", i.e. functional chunks of value that can be developed in a sprint (Bergier, 2011). This list represents the functional scope of the

product. It is not set in stone and evolves over time according to requested modifications and new priorities encountered.

- The sprint backlog: this represents the part of the product backlog under development in the current sprint. It is the set of tasks to be carried out during the sprint.

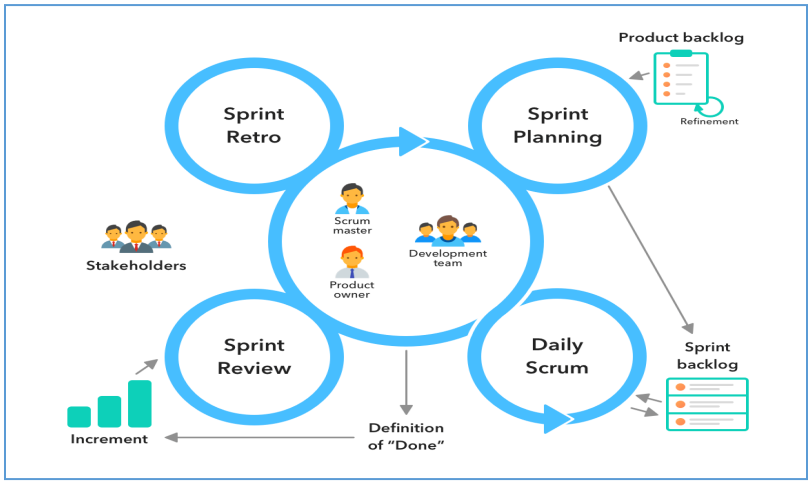

Figure 1: the SCRUM agile method

Figure 1 shows the steps involved in the Scrum process. The Scrum process is framed by five ceremonies (meetings defined within the Scrum framework):

- Release planning: a meeting to prioritize user stories and allocate them to the project's sprints.
- Sprint planning: a meeting designed to break down the user stories of the sprint to be launched into short development tasks.
- Scrum meeting: a daily 15-minute meeting at which each team member reports on what they did the previous day and what they're going to do today.
- The sprint review: a meeting aimed at showing the partial functional product. The PO can then compare the product with his request and, if necessary, propose modifications. Taking modifications into account means adjusting the product backlog and therefore the content of each sprint. In fact, the schedule may have to be adapted to take account of the modifications requested.
- The retrospective: a meeting that only concerns the project team and aims to identify what is working well and what needs to be changed, in order to collectively find solutions.

Scrum is an agile method dedicated to project management. The aim of this management method, or rather project management framework, is to improve team productivity. In an agile project, there's no need to specify and plan the entire target product. A first objective is set in the short term, and its realization begins immediately. When this first objective is reached, we stop, take stock, note possible improvements, set the next objective and start again in a realization phase... and so on until the final product is obtained. In concrete terms, with an agile project management method, the customer describes his vision of the product and the functionalities he would like to see included. This list of features is then submitted to the development team, which provides an estimate of the cost of implementing each of them.

Scrum is an agile project management methodology characterized by its flexibility and ability to adapt to changing project needs. It is based on a structured framework of roles, events and specific artefacts. In the context of managing an e-Learning platform, Scrum can be adapted to meet the needs of instructional engineering. Scrum roles such as Product Owner, Scrum Master and development team can be reassigned to suit the actors involved in creating an e-Learning platform.

2.2. Pedagogical engineering of an e-Learning project using the ADDIE model:

Many training programs claim to offer e-learning to their participants. The fact that it is accessible online does not in itself justify that the program has been built with learning in mind. The pedagogical strategy for delivering this content must be based on a well-thought-out development process. Various notions can guide the different educational strategies used.

Pedagogical engineering, formerly instructional design (Basque, 2017), also called instructional design (Trestini, 2016), learning design (Baron, 2011), "consists in studying, designing, realizing and adapting teaching devices, training, or courses" (Trestini, 2016). It defines all the elements of a course or training program, including its context, the knowledge and skills to be acquired, the scheduling of activities, the resources used and its delivery (Paquette, 2002). It therefore involves many actors linked to learning (instructional designers, learning facilitators, content experts, evaluators, learners, learning system applicants or even researchers), technologies (mediators) or project management (Basque, 2017). Pedagogical engineering attempts to respond to the complexity of device design (Chachkine, 2011). It follows phases defined by engineering models that may be circumscribed to a specific field (e.g. education) or be more general (Harvey and Loiselle, 2009).

The ADDIE model is the historical model for e-learning training engineering. More than 100 e-learning engineering models are based on ADDIE, with some variations and adjustments. ADDIE is the acronym of the five classic phases in the lifecycle of a learning system (Basque, 2017), which gave it its name from 1995: Analysis, Design, Development, Implementation and Evaluation (Clark, 1995).

Synthetically, analysis measures the difference between the current state and the desired state (Lepage *et al*., 2015) on different levels of the project, such as the training need, target clientele, context, constraints or learning resources (Basque, 2017). Design involves making choices among the various components of the device (objectives, strategies, media, pedagogy, techniques, evaluation methods, content organization and presentation). Development is the stage of realizing the device. Implementation (or dissemination) is the process of making the system available. Evaluation measures success and potential for improvement.

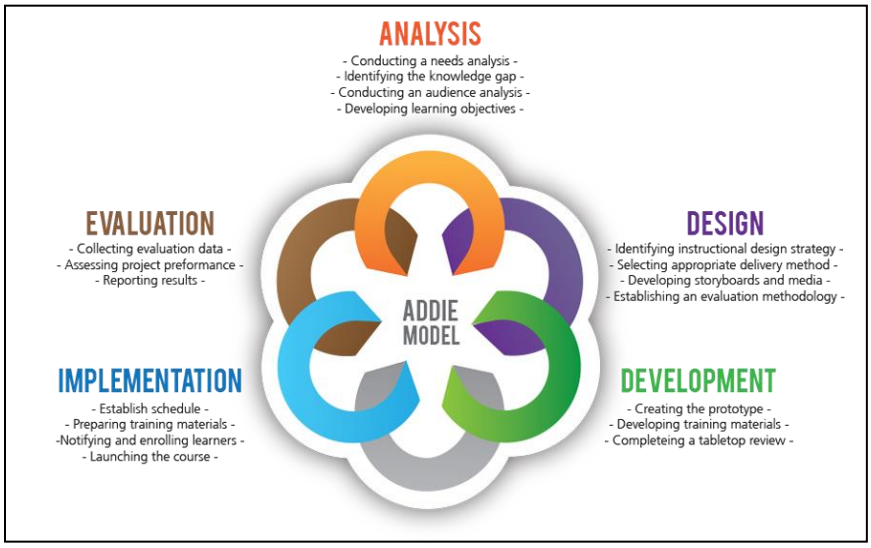

Figure 2: ADDIE model (Analysis, Design, Development, Implementation and Evaluation)

The design and management of an e-learning program is based on analytical or pragmatic methods/approaches. The pedagogical, technical, economic and organizational specifications are an essential phase to be developed from one of these approaches. Storyboarding is an important step in defining the various deliverables. The ADDIE approach is the easiest to implement for less experienced people. It defines the different phases of the project.

The waterfall model, like the ADDIE model, is used in many companies to produce e-learning modules. However, this way of working poses a number of problems for instructional designers. These include extended development cycles, communication with business experts and stakeholders, lack of time for the testing phase. To overcome these difficulties, we decided to integrate Scrum, which uses a sprint method for incremental development. A key feature of Scrum is its emphasis on organizing cross-functional teams and defining each role and responsibility in the development process, combining elements of the ADDIE model and implementing them in two-week sprints.

3 Results and Discussion

3.1 The parallels between management methodologies and the pedagogical design of an e-Learning project:

The ADDIE and Scrum frameworks are two development methodologies used to guide teams in the implementation of e-Learning projects. The philosophies of ADDIE and Scrum share many of the same practices. The Agile Scrum and ADDIE methodologies include analysis, design, development, implementation and evaluation as part of their process, but the Agile methodology has distinct characteristics that set it apart from ADDIE. Incremental organization, flexible planning, collaborative and transparent processes are the hallmarks of a project using Agile methodology.

Scrum is the best-known agile framework, used by companies of all sizes to manage ongoing projects and workflows. Where ADDIE requires each design stage to be completed before moving on to the next, Scrum is iterative, allowing different stages to be worked on simultaneously. If a department is swamped with e-learning project requests, Scrum can help prioritize tasks to respond more quickly to demand. It emphasizes collaboration, transparency and deliverables, making it an excellent continuous workflow model for tackling both large and small projects. The emphasis on accountability means that managers can easily see what everyone is working on, and maximize efficiency.

3.2 Adopting the SCRUM approach to designing an e-Learning project according to the ADDIE model

The application of some of the best practices learned from the hugely successful Agile/Scrum software development to the ADDIE model for instructional systems design.

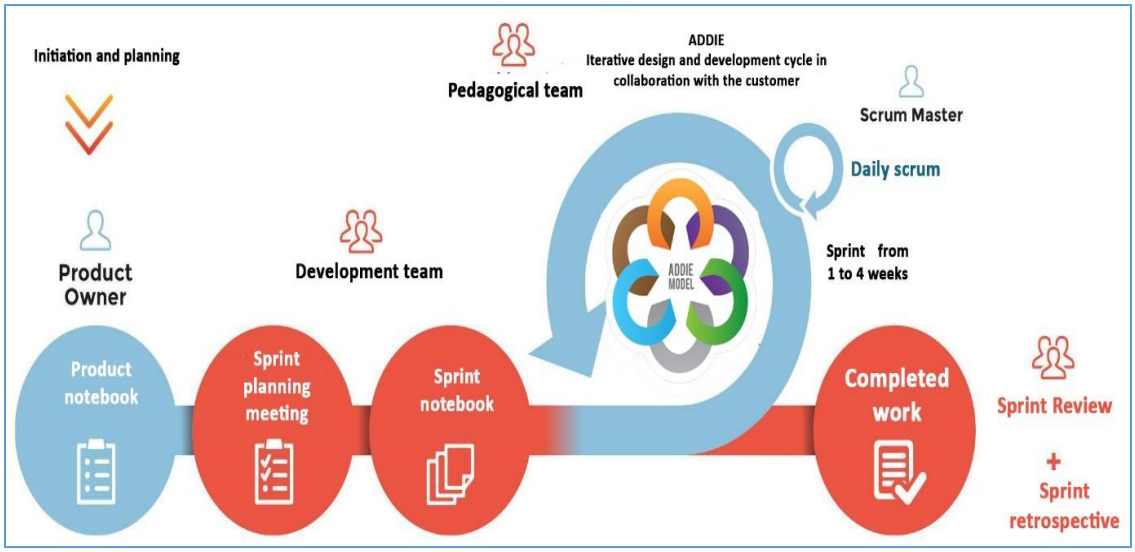

Figure 3: ADDIE and Scrum for designing and managing e-Learning projects

Figure 3 suggests a hybrid project management approach where certain phases at the beginning and end of a project are linear, and project execution (design and development) is iterative in nature.

This framework comprises five phases: initiation and planning, sprint planning meeting and implementation of a sprint log, iterative design and development according to the ADDIE model, deployment of work, sprint review and retrospective.

Initiation and planning: The first phase is linear and includes project definition, identification of business and educational needs, specific project goals and objectives, stakeholder identification, high-level assumptions and constraints, high-level budget and schedule, risks, dependencies and acceptance criteria. This phase includes high-level planning.

Sprint planning meeting: one of the most important stages of a Scrum project, it consists exactly in going through its objectives and its place in the project and its organization, which will also serve to answer two important questions:

- What can be done in this sprint?
- How can the selected product backlog items be transformed into a completed increment?

The maximum duration of sprint planning is 8 hours for a 4-week sprint. This time is proportionately less if the sprint duration is shorter. All sprint planning is grouped together in a notebook called the Sprint Notebook.

Iterative design and development according to the ADDIE model: Project execution takes place during the third phase, which is iterative by nature.

The product owner (Product Owner PO), in collaboration with business stakeholders and the educational team, maintains a hierarchical product backlog containing refined user stories. During release and sprint planning meetings, the project team selects the amount of work it thinks it can achieve in each sprint, and the number of sprints needed to properly deliver or release the feature.

Each feature generally goes through iterative ADDIE cycles (Analysis, Design, Development, Implementation and Evaluation). In this stage, the features published in the various release cycles are integrated to form an end-to-end solution. The product is deployed on the test system running the Learning Management System (LMS) to ensure quality and meet user needs, while individual functionalities are demonstrated and tested at the end of each release.

Deployment of work: Once the solution has been properly tested and end-user feedback incorporated, the solution is ready to be deployed on the production system and go live. As every project brings changes, this phase usually includes communication and change management to ensure wider adoption. The end of this phase marks the closure of the project and the transition to operations.

Retrospective sprint review: this phase may include an evaluation survey against the project's success criteria and a formal acceptance signature from the sponsors.

This example illustrates the process of integrating the ADDIE model and the Scrum method into the pedagogical engineering of a training course:

- **Pedagogical Analysis (ADDIE) and Scrum Planning:**

The team begins with an in-depth analysis of learners' needs, identifying existing gaps in educational resources. The Product Owner, in collaboration with the pedagogical experts, defines the learning objectives. These are integrated into the Scrum product backlog, with priorities determined according to needs.

- **Iterative Design and Development (ADDIE and Scrum):**

Initial lesson design is based on ADDIE Model Analysis. Using Scrum, two-week iterations are planned. The development team creates a first version of the lesson, gathers feedback from pedagogical experts and learners, then makes adjustments in the next iteration. This iterative process continues until the lesson achieves the desired quality.

- **Continuous evaluation (ADDIE and Scrum):**

After the initial deployment of a section of the course, evaluations are collected via surveys and learner feedback. The Scrum Master organizes regular retrospective meetings to discuss the feedback with the team. Based on this information, changes are made to future iterations, enabling continuous improvement in content quality.

- **Scrum Meetings and Stakeholder Communication**

The team organize regular Scrum meetings to discuss progress, obstacles and necessary adjustments. The Scrum Master communicates this information to stakeholders at dedicated meetings. For example, if changes in learners' needs are identified, the Product Owner adjusts the product backlog accordingly, ensuring immediate responsiveness.

- **Reduced Development Time (Scrum):**

Using Scrum, a team succeeded in reducing the overall development time of an online course from 30 weeks to 24 weeks. Rapid iterations enabled problems to be detected and resolved quickly, avoiding major schedule delays.

These examples demonstrate how the integration of ADDIE and Scrum enables more agile, responsive course design focused on the real needs of learners, while respecting the pedagogical objectives defined in the Analysis phase of the ADDIE model.

3. The actors in the ADDIE and SCRUM integration cycle:

In the integration of the ADDIE model and the Scrum agile method for the pedagogical engineering of a training course, several players play key roles in ensuring the success of the project. Here are the main players and their roles in this process (Table 1):

Table 2 Actors in the ADDIE and SCRUM integration cycle

Actors	Roles	
	SCRUM	**ADDIE**
Product Owner	The Product Owner is responsible for the project vision, defining learning objectives and creating the product backlog. He or she identifies learners' needs and prioritizes functionalities or content elements according to their importance.	The Product Owner plays an essential role in the Analysis phase of the ADDIE model, identifying learning objectives, learner needs and establishing the project vision.
Scrum Master	The Scrum Master is responsible for ensuring that the Scrum team follows Scrum principles and processes. He facilitates meetings, removes obstacles and supports the development team.	The Scrum Master contributes to coordination and communication within the project team, fostering greater collaboration when applying the ADDIE model.
Development Team	The development team is made up of instructional designers, developers, graphic designers and other experts involved in creating learning platforms. They are responsible for implementing the tasks identified in the product backlog.	The development team implements the phases of the ADDIE model, such as design, development, implementation and evaluation, using Scrum iterations to continually adjust and improve content.
After integration		
Learner	Learners play an essential role by providing feedback, comments and evaluations throughout the process. Their needs and reactions	

	are taken into account to adjust and improve the pedagogical content.
Pedagogical Experts	Pedagogical experts, such as pedagogues, educational psychologists and training specialists, provide advice on instructional design, the development of learning objectives, and the evaluation of pedagogical effectiveness. They collaborate with the Product Owner and the development team to ensure that pedagogical methods are appropriate.
Stakeholders	Stakeholders, who may include the educational institution's management, project sponsors, and other stakeholders, support the project, provide resources and strategic guidance. They must be kept informed of project progress and decisions.

The integration of ADDIE and Scrum implies strong collaboration between these players to ensure that pedagogical objectives are met, that content is of high quality, and that the process is agile and responsive to the changing needs of learners. Each of these players plays a crucial role in the successful pedagogical engineering of a training course based on this hybrid approach.

The ADDIE model is often criticized for its linearity, which can make it difficult to adjust along the way in response to learner feedback or technological developments. Integrating Scrum with ADDIE alleviates this problem by introducing shorter iterations and opportunities for constant revision and improvement. For example, after the Analysis phase of the ADDIE model, Scrum can be used to rapidly iterate on Design, Development and Implementation according to the changing needs of the learner.

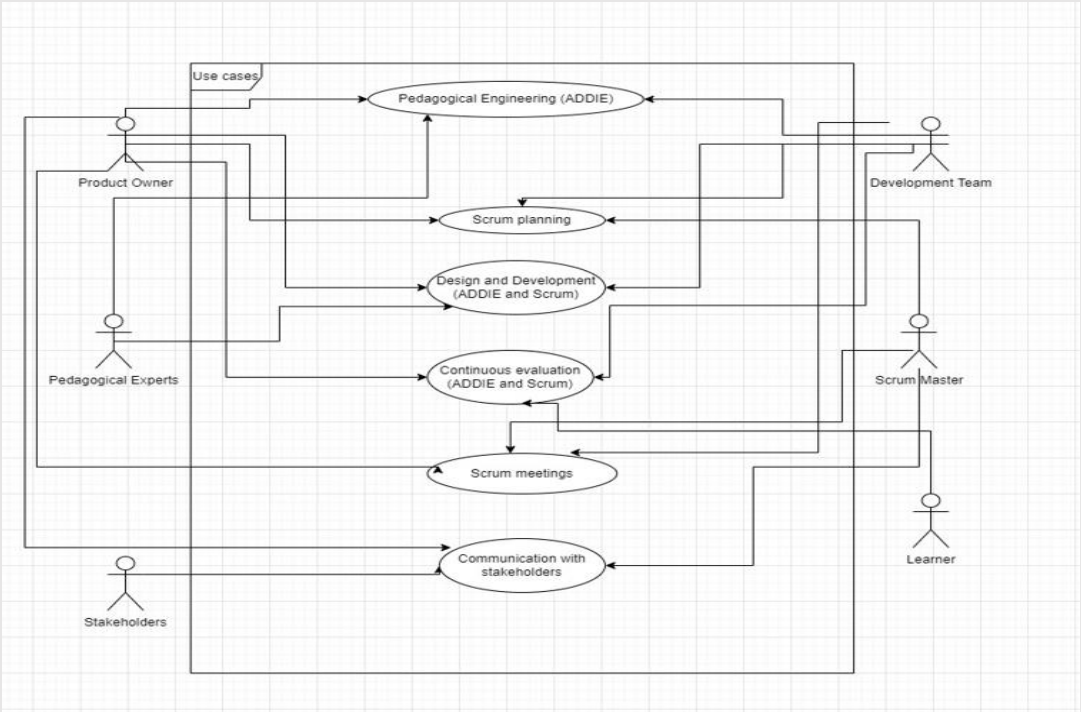

Figure 4: A use case diagram to illustrate the process of integrating the ADDIE model and the Scrum method

Figure 4 present a use-case diagram to illustrate the process of integrating the ADDIE model and the Scrum method, which involves representing the actors, the use cases and the interactions between them.

Use cases:

1. Pedagogical engineering (ADDIE)

   - Actors: Product Owner, Pedagogical Experts, Development Team

   - Description: Identify learners' needs, define pedagogical objectives and establish the project vision.

2. Scrum planning

   - Actors: Product Owner, Scrum Master, Development Team

   - Description: Draw up the product backlog, plan iterations (Sprints), and define specific objectives for each iteration.

3. Design and Development (ADDIE and Scrum)

   - Actors: Product Owner, Development Team, Pedagogical Experts

   - Description: Perform design and development tasks in successive iterations, integrating feedback from learners and pedagogical experts.

4. Continuous evaluation (ADDIE and Scrum)

   - Actors: Product Owner, Development Team, Learners, Pedagogical Experts

   - Description: Collect regular feedback, evaluate progress, and adjust pedagogical content according to the results obtained.

5. Scrum meetings

   - Actors parties: Scrum Master, Product Owner, Development Team

   - Description: Organize regular Scrum meetings to discuss progress, obstacles, and plan next iterations.

6. Communication with Stakeholders

   - Actors: Product Owner, Scrum Master, Stakeholders

   - Description: Maintain constant communication with stakeholders to share updates, gather feedback and ensure support.

   - The "Scrum Planning" use case is linked to the "Pedagogical Analysis" and "Design and Development" use cases to ensure planning aligned with pedagogical needs.

   - The "Design and Development" and "Continuous Evaluation" use cases are interconnected to enable rapid iterations and continuous content improvement.

This diagram provides a visual overview of the process of integrating the ADDIE model and the Scrum method into the pedagogical engineering of a training course. It highlights the interactions between the players and the stages in the process, making it easier to understand the hybrid approach.

4 Conclusion

The creation and management of e-Learning platforms is a long, complex and energy-consuming process, involving a wide variety of stakeholders (content experts, instructional designers, web and multimedia developers, etc.). This type of project generates a number of challenges: effective coordination between team members, design of activities and materials adapted to e-learning, implementation of all this on the platform used. The ADDIE methodology organizes practices into five sequential phases, with each phase the subject of a process designed to achieve a sufficiently solid definition to propel e-learning teams into each subsequent phase of the learning design process. They focus on quality at the end of the process, in the "Evaluation" phase. It is during this phase that e-learning teams and project stakeholders work together to determine the effectiveness of the work product and make adjustments. This contrasts with Agile methodology, which works in "sprints" or "iterations", short two-week periods during which the e-learning team implements and delivers an increment of work product for evaluation to ensure quality. With the Agile method, everyone is involved, including learners, designers, managers, customers and stakeholders. Effective collaboration is therefore crucial. Our proposal is a presentation of an approach that enables the IT management of an e-Learning project and the pedagogical engineering of the project with the two methodologies Scrum and ADDIE in particular when creating e-Learning solutions to improve performance. As well as providing continuous visibility and communication, managing an e-learning project with this framework also means that the practice of iterating as required helps to respond to and manage risks in a way that complements instructional design models.

Declaration of Conflict of interest

The authors declare that they have no conflict of interest.

Authors' contribution

All authors contribute equally.

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Original Article

Effects of Peer Teaching Method in Software Testing Course in Comparison with Traditional Teaching Method

Girma Neshir Alemneh

Addis Ababa Science and Technology University, Ethiopia

Email: - girma.neshir@aastu.edu.et

Abstract

This action research project incorporated peer teaching model for creating active learning environment for teaching the course "Software Verification, Validation and Testing". Topics covered in the course comprised overview of software testing, software quality, types of software testing, test case design techniques, test documentations, software test frameworks; model based testing, software verification and validation. The aim of the research was to explore to what extent the peer teaching would increase students' learning motivation, engagement, develop critical thinking skills, and their performance. The research was conducted for one semester and data were generated using questionnaire, test scores, and students' activities record as instruments. The test score data is collected from 10 students taking the course. The data were analyzed using both qualitative (textual data obtained from open ended response) and quantitative (numerical data from questionnaires, and test scores) methods. The result showed that peer teaching approach has positive effect in the attitudes of students towards software testing course compared to lecture mode instruction.

Keywords: - Action Research, Software Verification, Validation, Peer Teaching

1 Introduction

Action research is an approach to educational research that is commonly used by educational practitioners, and professionals to examine, and ultimately improve their pedagogy and practice (Clark, Porath, Thiele & Jobe, 2020). They carried out action research to provide knowledge related to teaching, learning and assessment of students' affective, cognitive needs and cultural and socio economic factors of the schools and other factors related to improving schools. Stakeholders in

education sector make decisions affecting quality of education for their students and intervene based on the knowledge obtained with the research results.

An action research is situation and context based, collaborative and participatory, iterative and ongoing undertaken by individuals with a common purpose. It may have four stages/cycles: (a) propose a change, (b) engage in action, (c) observe results and (d) reflect on action. These research cycles have also many other models with consideration of other basic supplementary processes. The models are describing the same process of action research with different characterization. In such a perspective, the teacher is the researcher and students are target population from which data are collected and the teacher identifies, analyzes data, reflect on action and plan for the next time intervention. The overall purpose of this study was to examine the effects of peer teaching method on students' attitude towards software testing course and their performance in software testing.

2 Related works

This section presents a brief review of key related research papers on investigation of peer teaching as active learning techniques on various disciplines such as computer science, mathematics, biology, geology, education, English and physics. In the end of this section, research questions which are going to be addressed are stated in order to investigate effect of peer teaching to conduct software testing, verification and validation course for post graduate program in the department of software engineering.

Yıldız & Gündüz (2020) investigated the effects of peer teaching method in programming teaching on secondary school students' attitudes towards software courses and their perception of programming self-efficiency comparing to traditional teaching methods are examined. Both quantitative and qualitative research approaches have been used. With quantitative research, pre-test post-test control group and semi-experimental research model have been utilized on the other hand a qualitative research is used to deeply describe the different thoughts and opinions of students about peer teaching method in a more detailed way. Semi-structured interview was conducted with 12 volunteered students from experimental groups. The research findings has shown that peer teaching method increases students' perception and programming skills compared with traditional teaching method. Students participated in peer teaching method said that peer teaching method

helped to improve their communication skill and suggested the method to be applied in the other course as well.

The peer teaching method is one of the active learning models that allow the student to understand the concepts of software testing and students can able to answer comprehensive questions and helps to retain concepts to apply it in capstone projects and further discuss it with peers. In this method, a significant contribution is made to the success of the student who gets help from the peer.

Peer teaching is proven active learning model which is tested in different ways on different disciplines and there are studies examined the effect of the peer teaching in computer courses teaching on the students' performances and attitudes in the literature. To name a few, microteaching physics and mathematics in high school (Sanaeifar *et al*, 2020), effects of peer teaching pre-services physics (Shen, 2010), investigated combined microteaching and simulation for initial teacher educators (Ledger & Fischetti, 2019), peer-designed active learning modules as a strategy to improve confidence and comprehension within introductory computer science (Packard *et al*., 2020), investigation of effects of peer tutoring on the academic achievement of students in the subject of biology at secondary level (Ullah, Tabassum & Kaleem, 2018), studying a peer-teaching model using geospatial open source tools to address community health issues (Jones, Darsow & Jones, 2020), investigating effect of peer teaching on academic achievement of the undergraduate students (Abdelkarim1 & Abuiyada, 2016).

3 Research method

In order to answer aforementioned research questions, the research method followed, teaching design, research design how to collect data and the type of data are discussed in the following section. Mixed research approach that is combination of quantitative and qualitative research methods is used in order to answer the above-mentioned research questions.

A mixed research approach was employed in order to get a comprehensive and complete picture of the solutions to the research questions. Indeed, this research design will collect both qualitative and quantitative data. Those data were analyzed separately and finally the findings were interpreted together. In quantitative part, pretest, and post test scores of participants/learners were collected.

3.1 Teaching Design

Software Verification, Validation and Testing (SVVT) course has four course learning outcomes (CLO). These include restated the as upon successfully completing this course, a student should be able to CLO1: Identify different testing techniques and design test plans, develop test suites, and evaluate test suite coverage, CLO2: Produce quality software in line with software requirements, standards and guidelines, CLO3: Use testing frameworks and testing tools, and CLO4: Apply the concepts and theory related to software verification and validation. To achieve these CLOs, the course content is divided into seven chapters. And SVVT course description comprises of discussion of basic concepts of software testing and error handling and debugging mechanisms. It focuses on applying techniques to design test cases, test plan and implement for ensuring software quality. SVVT course consists of basic and advanced software testing principles: white box testing based on code analysis, black box testing, inspection and reviews, and other advanced testing issues like software testing frameworks, model based testing. The teaching SVVT course has been designed at three stages of the course. These include the pre-class, in-class and post class. The activities in these stages are described below.

Pre-class: The course has seven units. The first three units are offered using traditional lecture method by the teacher. In the remaining part of the course, each student (10 Post graduate students = 4FTP + 6Regular) has been assigned a topic and all the lecture slides have been given for guiding them to prepare their own lecture slide that is to be presented for 10 minutes.

In-class: The assigned student has been instructed to take responsibility for teaching the topic. For each peer teaching session, 10 minutes is allocated depending on the coverage and depth of the assigned topic. The teacher facilitates the peer teaching presentation session, and the rest of the session's time is used for question and answering, followed by comments on the session and closes with highlighting key points of the session. Continuous assessments including final exam are delivered to students taking the course.

Post-class: At the end of the course class, questionnaires have been administered to be filled by students. Almost all the questions in the questionnaire are open ended questions and students are asked to give feedback on the course using Google form. This is to collect qualitative data about the effect of peer teaching in their motivation and attitude on the learning of software testing course in comparison with traditional teaching methods. Using open-ended questionnaire, among 10 students, only 7 students give their feedback on the course. On the other hand, as part of quantitative

part, students' test scores on the course assessment were used. In line with this, before intervention and the other after intervention assessment scores were used to compare effect of peer teaching on the performance of students.

3.2 Research Design

Students in regular M.Sc. in Software Engineering program (who were registered for the course Software Verification, Validation and Testing in 2022/23) are considered. The quantitative data were analyzed using statistical techniques (i.e. t-test). In this research, the independent variable comprises of the peer teaching presentation whereas the dependent variable is their attitude, engagement and performance on the course.

Data collection: In the study, open ended questionnaires were developed by the researcher for collecting qualitative feedback on software verification, validation and testing course from learners.

Results: After the collected data (both qualitative and quantitative) were obtained, findings of the statistical analysis on the quantitative data were used as the solution of the sub-problems of the research and their interpretation were presented. Besides, the interpretations of the results gained from the analysis of the qualitative data were used to address the research problem/questions with in depth.

Analysis: The collected data was analyzed depending on the type of data. Quantitative data such as the students' scores in the course were analyzed using statistical methods whereas the qualitative data obtained from questionnaire was analyzed using content analysis. Statistical analysis helps to answer whether there is significant performance gain of students comparing two assessments administered before and after peer teaching is introduced. With both quantitative and qualitative analysis, finding were interpreted and have more credible answers to the research questions stated earlier.

4 Results and Discussion

According to the analysis of the collected data, the answers to the aforementioned research questions can be briefly answered as follows.

RQ1. *What is the effect of the peer teaching model in software testing teaching on the attitudes of students towards Software course compared to the traditional teaching method?*

According to the qualitative analysis of learners' responses to questionnaires, six of the seven students argued that peer teaching approach has positive effect in the attitudes of students towards software testing course comparing to lecture mode instruction. Sample textual responses from Google form of one of the learner is depicted in text below.

> "*The positive effects included that we were required to deep search the topics we were assigned therefore we had a better understanding of the topics. Another positive effect is that we had the opportunity to practice our presentation skills. We were also able to see our classmates present and this allowed us to learn from our peers. I wasn't affected on a negative note when it came to this change in the learning process*."

Another respondent also stated in his response that:

> "*Positive: we searched more on the subject and practiced how to deliver or teach other, Negative: May be some students fear to communicate (deliver) their knowledge*"

Peer teaching software verification, validation and testing showed positive effect in the process of learning and the negative side of peer teaching is time consuming to prepare presentation slides and some students are shy to communicate inform of students.

RQ2. *What is the effect of peer teaching method on software testing students' performance compared with traditional teaching methods in software testing teaching?*

Though the background of learners might have disparities to some extent (regular and FTP), the test scores of the learners in the second assessments after peer teaching had introduced showed higher performance as compared to the performances of the learners in the assessment on lecture method. In other words, the intervention of peer teaching method showed encouraging effect in students' performance as compared to lecture mode instruction of software testing course. The statistical test comparison of students' performance between two scores with independent sample t - test indicated difference in probability distribution ($0.0481 < p\text{-value} <= 0.05$) on the assessments scores (before and after scores) with the assumption that the two assessment scores were independent samples. Therefore, we do not reject the null hypothesis of equal population means. If the p-value is smaller than our threshold, then we have evidence against the null hypothesis of equal population means. By default, the p-value was determined by comparing the t-statistic of the

observed data against a theoretical t-distribution. This implies the performance of the students after peer teaching is introduced is significantly greater than performance before peer teaching (i.e. lecture mode).

In addition, one of the questions in the questionnaire was asking respondents rate level of acquiring each course learning outcomes with 5 scales (poor, fair, satisfactory, very good, and excellent). Accordingly, their responses were from very good to excellent on attaining the four course learning outcomes (see Figure 1). However, two respondents rated the second course learning outcome as satisfactory. The reason could be due to shortage of time to practice for their capstone project and limiting them to create quality software; they did not attain it to the expectation of the course.

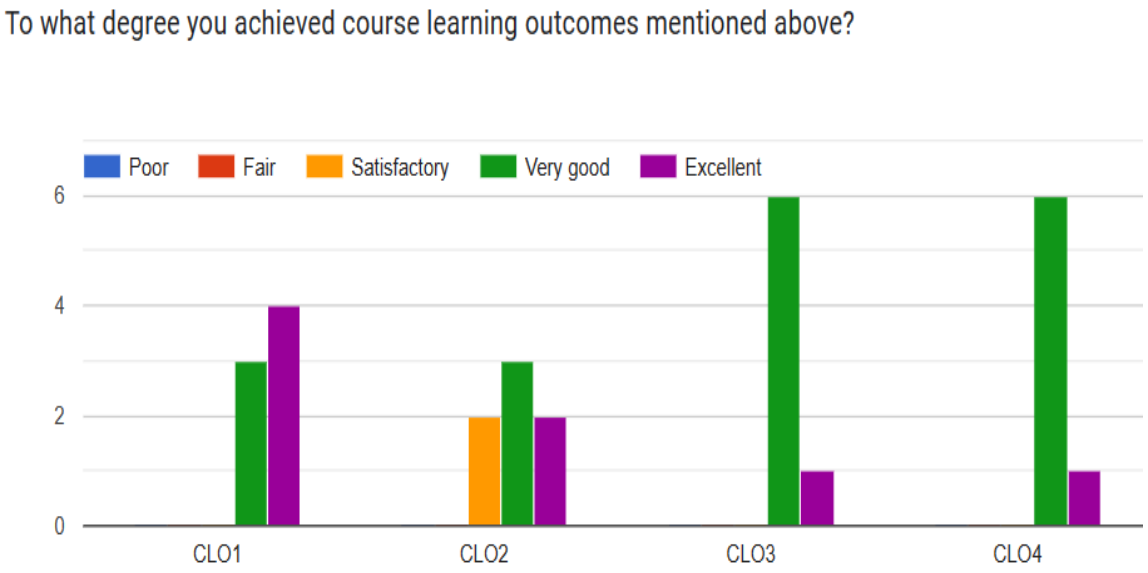

Figure 1: students' response of their ratings on course learning outcome attainment

RQ3*. What are the student views of the peer teaching method applied in software testing teaching?*

Based on most of the responses of learners, peer teaching improved their engagement, and their intercommunication skills compared to lecture mode instruction of software testing course. As short coming, some of students stated that it consumes their time in preparation of their peer teaching presentation. For example, one of the responses confirmed this argument.

> "*We were assigned to present with a fellow classmate therefore we had to communicate and collaborate. Therefore, we were able to improve both our communication skills and relationships*."

Apart from students' performance improvement on the course, students' communication skills and relationships with their peers has shown improvement once peer teaching is used in place of lecture instruction.

There is also a question in the questionnaire asking respondents to give their view whether to apply peer teaching in another software engineering course. Most of the respondents suggested peer teaching to apply in all other related software engineering courses. In arguing this statement, one of the responses is shown below:

> "*I think peer teaching can be an optimum method to not only learn software engineering but also any type of engineering course*."

Within the scope of the research, when the students were asked whether they wanted a peer teaching method to be applied by other teachers in different courses, all of 7 students except 1 student are agreed to peer teaching to be applicable all other software engineering course.

5 Conclusion

Based on the findings, peer teaching method for teaching software verification, validation and testing course has a positive effect on students' attitude and performance compared to traditional teaching mode. The opinions in favor of the conclusion that the peer teaching method in software testing teaching improves the attitude and performance of software verification, validation, and testing are frequently observed when the results from the questionnaires and test scores are examined.

Declaration of Conflict of interest

The author declare no conflict of interest.

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Original Article

Factors Affecting Students' Academic Learning Motivation in Yeka Sub-City Second Cycle Primary Schools

Seid Habtamu[1] Oumer and Yenesew Ferede Eshete[2]

[1]Department of psychology, E-mail: habtmuseid@yahoo.com
[2]Department of management, E-mail: yeniesew19@gmail.com
[1,2]Kotebe University of Education

Abstract

The purpose of this study was to examine factors that affect students' academic learning motivation in Yeka Sub-city second cycle primary schools. To achieve the stated objective, mixed method, in particular explanatory sequential design was employed. This study used questionnaire, focus group discussion (FGD) and interview so as to allow flexibility and the opportunity to clarify questions and responses with the subjects. 292 teachers were selected using stratified random sampling technique. Samples were selected considering sample Woredas' total number of teachers using proportionate stratified sampling. Sampling for the interview was purposive. On the other hand, all the available schools' Parents and teachers Association (PTA) were included in the study. The collected quantitative data were analyzed using descriptive statistics. The qualitative data was analyzed qualitatively using narration. The result of the study revealed that students' academic learning motivation was low. Many factors seemed to impede this, including the low amount of energy students exerted, and the teaching methods used by teachers. Here, teachers' teaching performance, administrators' school management ability in fulfilling what the students need and students' learning satisfaction had influence on students' academic learning motivation. Thus, there should be opportunities for students to plan activities according to students' interests and needs and different concerned bodies should take measures to increase the students' academic learning motivation. Finally, considering the results of this study extensive research on the relationship between teaching methods and strategies and student academic learning motivation should be done.

Key words: Academic learning, mixed method, motivation, students

1 Introduction

In this era of globalization and technological revolution, education is considered as a first step for every human activity. It plays a key role in the development of human power and is linked with an individual's well-being and opportunities for better living (Farooq, 2011). Education ensures the acquisition of knowledge and skills that enable individuals to increase their productivity and improve their quality of life (Saxton, 2000). On the other hand, students' academic learning motivation remains at top priority since it determines their academic achievement. It is among the most powerful determinants of students' success or failure in school (Hidi & Harackiewicz, 2000; Sternberg & Wagner, 1994).

Efficient learning does not depend only on methods and forms of work in the teaching process, but on feelings of students and their attentiveness, attribution and goals (Morgan, 2006). Researchers and teaching practitioners acknowledge that motivation is an important quality that imbues all aspects of teaching and learning (Schunk *et al*., 2013). The concept of motivation is applied to explain moving strength, its direction and intensity, persistence and quality of behavior, especially the one directed to execution of certain aim (Brophy, 2015).

Sukmadinata (2003) reported that learning motivation is influenced by intrinsic and extrinsic factors. Intrinsic factors that influence motivation include needs, interest, and enjoyment. Whereas, extrinsic factors which influence students' motivation level include the students' social life, the teacher, the method, and the learning environment.

As revealed by Crosnoe *et al*., (2004) at primary level motivation plays important role as compared to the other levels of learning due to the fact that young learners need to be motivated towards learning as they experience the new knowledge. Primary education plays a crucial role in laying the foundation for the further education of students. If a good foundation is laid at the primary school level, students can better cope the challenges of life with ease (Kpolovie *et al*., 2014).

Educators, trainers, and researchers have long been interested in exploring factors affecting students' academic motivation. These factors may be termed as student related factors, teacher related factors, and administrative factors (Crosnoe *et al*., 2004). These factors considerably influence the students' academic learning motivation and ultimately, they affect the students overall academic performance (Oroujlou & Vahedi, 2011).

Indeed, several studies have been conducted on factors that affect learning motivation. According to Spolsky (2000) the most meaningful factors that affect learning motivation are the teaching method, the age, the aptitude, the attitude of learners. Redondo & Ortega (2015) also reported that attitude is the most important factor that affects academic learning motivation because it directly relates to the education context that surrounds learners.

Previous studies have also shown that teachers' behaviors and instructional practices play an important role in students' motivation to learn (Niemiec & Ryan, 2009; Papi & Abdollahzadeh, 2011; Urhahne, 2011; Loima & Vibulphol, 2016). In Ethiopian context, the study conducted by Fanaye, Dagne & Beshir 2019) on determinants that affect students' motivation in physical education learning in Sandafa Woreda high schools revealed that schools, teachers and students related factors affect learning motivation.

As far as the researchers' closer review and knowledge is concerned, it was difficult to obtain studies conducted on factors that affect students' academic learning motivation in Addis Ababa city administration. Taking literature-driven data in to account the study has been conceptualized to identify determinant factors that affect students' academic learning motivation in Yeka Sub-city second cycle primary schools and could be illustrated as follows.

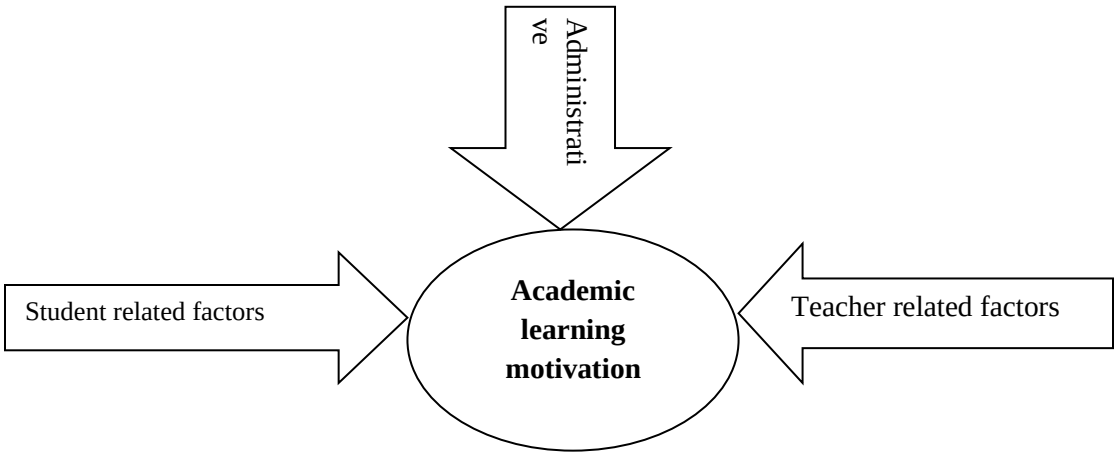

Figure 1: Conceptual Framework of the Study

Source: Brophy, 2015

2 Methodology

To achieve the objective of the study mixed method in particular explanatory sequential mixed method design was employed. Primary data which includes both qualitative and quantitative were collected through questionnaires, interviews and focus group discussions. Before the tools were distributed, it was given for professionals in Psychology department for its content validity checking. The contacted professionals confirmed that the instruments had good content validity. The reliability of the distributed questionnaire for teachers was also checked and found to have the highest and the lowest Cronbach's Alpha values of 0.823 and 0.73 respectively. Thus, the reliability of the questionnaire was good.

The target groups of the study were students, teachers, principals and PTA (Parent Teacher Association) members in Yeka Sub-city second cycle primary schools. As per the information obtained from Yeka Sub-city education office during the study period, in Yeka Sub-city, there are 14 *Woredas* and 31 primary schools. Except *Woreda* 9 in which there was no government owned primary school, one school was taken from the remaining 13 *Woreadas* as a sample for its representation. Thus, 13 government primary schools were selected randomly. In the selected schools there were a total of 1077 teachers. Then, out of 1077 teachers using Yemeane's formula (1967), 292 teachers were selected employing stratified sampling technique at 95% confidence level. Samples were selected considering each *Woredas*' total number of teachers (using proportionate stratified sampling).

For the purpose of focus group discussion, 4 schools were selected purposively considering schools' nearness to the researchers. All principals in the selected schools were included in the study using comprehensive sampling technique. Sampling for the interview was 'purposive'. Similarly, all the available schools' Parent and Teacher Associations (PTAs) were included in the study.

3 Results and Discussion

A total of 292 questionnaires were distributed for teacher respondents across the thirteen schools in Yeka sub-city. Out of which, 267 respondents properly filled and returned the questionnaire successfully with 91% response rate. The quantitative analysis was made based on these 267 respondents. In addition, the results of the focus group discussion and the interviews were presented using narration of what the informants said.

3.1 Demographic Characteristics of the Respondents

This section deals with detail presentation of the data related to the demographic characteristics of sample respondents' sex, age, educational status and service years as described below.

Table 1 Demographic Compositions of Respondents

Item	Response	Frequency	Percent
Sex	Male	145	54.3
	Female	122	45.7
	Total	**267**	**100.0**
Age in years	18-30	148	55.4
	31-45	100	37.5
	>45	19	7.1
	Total	**267**	**100.0**
Educational Status	Diploma	156	58.4
	Degree	109	40.8
	MA & above	2	0.7
	Total	**267**	**100.0**
Teaching Experience	1 Year & less	73	27.3
	1-5 Years	137	51.3
	6-10 Years	47	17.6
	>10 Years	10	3.7
	Total	**267**	**100.0**

As it can be seen above in table 1, majority of the surveyed respondents 145 (54.3%) are males and the remaining 122 (45.7%) are females. The sample population is largely dominated by respondents who are in between the age of 18-30 years covering 55.4% followed by the age group of 31-45 years (37.5 %). This implies that the participation of females in the sector is better than men and most of the surveyed teachers are young and productive.

Majority of the respondents are diploma holders which accounted 156 (58.4%). Regarding to teachers' work experience, they served schools from less than a year up to 10 years and above. Furthermore, most of the respondents served 1 up to 5 years which consists 51.3% of the

respondents. The result indicates that in the selected schools most of the teachers' service year was below five years and most of them are diploma holders which indicates that they are young and fresh graduates from different educational institutions.

3.2 Level of Students' Academic Learning Motivation

The table below provides the summary of descriptive statistics of the variables concerning students level of motivation that are evaluated based on a 5-point scale (1 being strongly disagree to 5 being strongly agree). As it is indicated in the table below, students learning value, students learning desire, motivational influence of the existing technologies to learn more, students' belief towards education as means of living a better life in the future, peer pressure and students background knowledge were used as an indicator of level of students' academic learning motivation.

Table 2 The Level of Students' Academic Learning Motivation

Items	N	Min.	Max.	Mean	Std. Deviation	Grand Mean
Students' learning value	267	1	5	2.18	1.043	**2.421**
Students' desire to learn	267	1	5	1.99	1.127	
The influence of the existing technologies	267	2	5	3.94	1.079	
Education is a means for a better life	267	1	5	2.37	1.066	
Supportive peer pressure	267	1	5	1.81	1.083	
Students background knowledge	267	1	5	2.24	1.031	

Source: Own survey

As observed in the above table, students leaning value has a mean score of 2.18. The mean score of students' learning desire, students' belief towards education as a means for better life in the future, supportive peer pressure and students' background knowledge were presented as 1.99, 2.37, 1.81 and 2.24 respectively. Whereas, the motivational influence of the existing technologies (film, social media, google etc.) to learn more has a mean score of 3.94. This implies that students' preference to use technologies for pleasure instead for academic purpose.

According to Zaidaton & Bagheri (2009) the mean score below 3.39 was considered as low; the mean score from 3.40 up to 3.79 was considered as moderate and mean score above 3.8 was considers as high as illustrated by comparison bases of mean of score of five point. Standing from

this, students' learning value showed low mean score. It implies that students did not have high value of learning. With regard to this, FGD participants believe that learning can change many thing including thinking pattern, knowledge, personal development and behavior of mankind, but as a result of current situation in which the educated individuals were not economically benefited which resulted for low value given for education as they reported.

In support of this one of the discussants said: "*we don't have interest because there is no job opportunity after graduation. That is why we don't care whether we fail or not''*.

Another participant also said that: "*in order to get good things in the future, education is a must whether we like it or not but it is not to say I do have unique interest to learn*". Similarly, the mean score of students' learning desire, students' belief towards education as a means for better life in the future, supportive peer pressure and students' background knowledge are low. It means that students have low learning desire and they did not have belief towards education as means for living a better life in the future.

There was also a finding that there was no encouraging and supportive peer pressure for high level of learning motivation. Just it is to mean that peers' lack of interest for learning creates another negative impact on other friends' academic learning motivation. Again, the other participant said: "*majority of the students believed that education is not worth to lead a successful life even it is not worth enough to buy 1 kilo of Onion so they prefer to engage in other works like driving*".

As per the negative influences of the existing technologies, the result shows there are students who spent much of their time by watching films on Kana TV, playing video games, watching films on mobile phones, frequently watching football matches. That is, to say using technologies inappropriately and not for academic purpose.

One student discussant said: "*personally, I don't have a problem with technologies but the problem is the way students use different technologies and the time spent on it is what matters. Even parents and teachers are expected to be blamed particularly for Kana TV watching, since teachers and parents watch it in offices and homes respectively. So, are we going to be blamed in doing so*?"

In addition, in line to this, one student said "*most students spend their time on watching Kana TV*. The availability of unnecessary videos and films, students' interest to implement what they have observed particularly from TVs.… Teachers also influence students while they observe Kana in

school since it can have its impact on student's behavior and time usage as reported from students "*teachers spent so much of our valuable school time watching television; but they never let their students watch it. Because, teachers believed students would waste their own time in doing so. This story is about a father who smokes advising his young boy on the dangers of smoking".*

3.3 Students Related Factors that Affect Students' Academic Learning Motivation

a) Self-efficacy and Aspiration

According to Behnke *et al*. (2004) and Tynes *et al.* (2015) self-efficacy and aspiration of students affect their academic learning motivation. There is an implicit notion that the beliefs of students about themselves and the expectations/aspirations they have for their academic performance are strong influences on their school motivation (Mcinerney & Mcinerney, 1994). In line with these four items were prepared to evaluate student's self-efficacy and aspiration.

Table 3 Descriptive Statistics of Self-efficacy and Aspiration of Students

Items	N	Min.	Max.	Mean	Std. Deviation	Grand Mean
Self-efficacy and aspiration Item 1	267	1	5	2.45	1.239	**2.28**
Self-efficacy and aspiration Item 2	267	1	5	2.43	1.139	
Self-efficacy and aspiration Item 3	267	1	5	1.99	1.235	
Self-efficacy and aspiration Item 4	267	1	5	2.25	1.122	

Source: Own survey

Table 3 above, depicts that when the arithmetic average scores of students' self-efficacy and aspiration are computed, it is found that the sub-dimension with the highest mean (2.45) is item 1 (students believe in their own ability to perform well in learning tasks) and the one with the lowest mean value (1.99) is item 3 (the aspiration of students to education is high). However, the mean score of all the sub-dimensions of self-efficacy and aspiration of students were low. Meaning students did not believe in their own ability to perform well in learning tasks and they do not believe that their efforts lead to success.

b) Active Learning Strategies

Concerning students' active learning strategies four items were prepared. The four items are students take an active role in using a variety of learning strategies (item 1), students attend their classes regularly (item 2), students actively participate in the class room (item 3) and item 4 says students ask questions when they appear confused. Each item is presented in the table below.

Table 4 Descriptive Statistics of Active Learning Strategy

Items	N	Min.	Max.	Mean	Std. Dev.	Grand Mean
Active learning strategy Item 1	267	1	5	2.34	1.087	**2.77**
Active learning strategy Item 2	267	2	5	4.14	1.107	
Active learning strategy Item 3	267	1	5	2.09	1.233	
Active learning strategy Item 4	267	2	5	2.54	0.859	

Source: Own survey

As show in the above table item 2 has a high mean score. Most of the respondents agreed that students attend their class regularly. However, the mean score of items 1, 3 and 4 were low indicating that most of the respondents show their disagreement. This implies that the students did not take an active role in using a variety of learning strategies.

c) Learning Value

Value of learning or schooling is how much students believe what they learn at school is useful, important, and relevant to them or to the world in general. The value of learning is to let students acquire problem-solving competency, experience the inquiry activity, stimulate their own thinking, and find the relevance of education with daily life. If they can perceive these important values, they will be motivated to their academic learning.

Table 5 Descriptive Statistics of Learning Value

Items	N	Min.	Max.	Mean	Std. Dev.	Grand Mean
Learning value Item 1	266	1	5	2.11	1.030	**2.202**
Learning value Item 2	267	1	4	2.10	1.043	
Learning value Item 3	267	1	4	1.97	0.782	

Learning value Item 4	267	1	5	2.41	1.158	
Learning value Item 5	267	1	5	2.42	1.078	

Source: Own survey

Learning value is how much students believe what they learn at school is useful, important, and relevant to them or to the world in general (Brophy, 2015). As shown in the above table item 1 (student finds the relevance of learning in their daily life has the smallest mean value of 1.97). Generally, the grand mean of learning value was 2.202 which indicates that the learning value of students is low. Specifically, the learning value items in the above table, indicates that students do not acquire problem-solving competency, experience the inquiry activity, stimulate their own thinking, and find the relevance of education with their daily life.

d) Striving for Excellence (Effort)

Striving for excellence was the variable that was considered in this study. Concerning this, five items were prepared as presented in the table below. The items are students study hard (item 1), students perform class work and assignment/project given by teachers (item 2), students make strong effort to achieve better results in their learning (item 3), students prepare themselves to get high marks in their learning (item 4) and students try to solve learning challenges by their own (item 5).

Table 6 Descriptive Statistics of Striving for Excellence

Items	N	Min.	Max.	Mean	Std. Devi.	Grand Mean
Striving for excellence Item 1	267	1	5	2.02	1.035	2.046
Striving for excellence Item 2	267	1	4	1.93	1.038	
Striving for excellence Item 3	267	1	5	2.15	1.145	
Striving for excellence Item 4	267	1	5	2.06	1.144	

Source: Own survey

Concerning striving for excellence, four questions were prepared as presented in the above table. The mean score for the whole items were low. This indicates most of the respondents replied that the sample students are not good at striving for excellence. They are not good at exerting strong effort to achieve better results in their learning.

e) Team Work/Learning from Others

Under this variable five statements are there such as students work well with other students in the classroom (item 1), students actively participate in classroom discussions (item 2), students actively participate in group work (item 3), students try to learn from others who are better than them (item 4) and students try to help others with learning difficulty (item 5). The descriptive statistics of each item are presented below.

Table 7 Descriptive Statistics of Team Work/Learning from Others

Items	N	Min.	Max.	Mean	Std. Deviation	Grand Mean
Team work Item 1	267	1	5	1.77	1.088	2.058
Team work Item 2	269	1	5	2.11	1.457	
Team work Item 3	267	1	5	1.99	1.071	
Team work Item 4	267	1	5	2.23	1.132	
Team work Item 5	267	1	11	2.19	1.158	

Source: Own survey

The mean score of each of the five items are approximately 2, which is low. In addition, as indicated above the grand mean value of team work is 2.058 which is also low. This implies that majority of the respondents disagreed about the positive statements presented above concerning team work. So, students are not good at team work or learning from others.

f) Desire to Learn/Interest

Regarding student's desire to learn five items are prepared. The items are students are interested to learn (item 1), students use their time properly to learn (item 2), students pay attention to their teachers when they are teaching (item 3), students show interest about subjects/topics being taught (item 4) and students concentrate in their academic work (item 5).

Table 8 Descriptive Statistics of Students' Desire to Learn

Items	N	Min.	Max.	Mean	Std. Dev.	Grand Mean
Desire to Learn Item 1	267	1	5	1.91	1.074	1.858
Desire to Learn Item 2	267	1	5	1.85	1.098	
Desire to Learn Item 3	267	1	5	1.96	1.045	
Desire to Learn Item 4	267	1	4	1.82	1.000	

Desire to Learn Item 5	267	1	5	1.75	1.008	

Source: Own survey

As presented in table above, the grand mean of all items score was 1.86 which is less than 2. Thus, respondents disagreed with the five statements such as students are interested to learn (item 1), students concentration in their academic work (item 2), students attention to their teachers when they are learning (item 3), students show interest about subjects/topics being taught (item 4), and students use their time properly to learn (item 5). So students' learning desire is low.

g) **Educational Goal**

Educational goal of students was one variable considered in this study as a student related factor that affect students' academic learning motivation. With this regard three items related to students set realistic and challenging academic goals (item 1), students try hard to attain their goals (item 2) and students set highest academic goals which can achieve (item 3) are prepared.

Table 9 Descriptive Statistics of Students' Educational Goal

Item	N	Min.	Max.	Mean	Std. Dev.	Grand Mean
Educational Goal Item 1	267	1	5	2.16	1.163	2.096
Educational Goal Item 2	267	1	5	2.27	1.291	
Educational Goal Item 3	267	1	5	1.86	1.098	

Source: Own survey

As depicted in table 9 above, the mean scores of the three items are approximately 2. This indicates that majority of the respondents disagreed with the statement that says students set realistic and challenging academic goal (item 1), students set highest academic goals (item 2), and students try hard to attain their goals (item 3).

Here, the qualitative finding of the student discussants revealed that most of the students have no interest to learn and their interest is shifted to money. Also, students are not effective in discussing, studying and doing tasks given in peer learning. They said: "*we don't use the network to work rather*

than using for playing and disturbing". They also blamed it as it consumes their time to be used for independent study.

Students also have language problem. As they said they couldn't understand what the teacher teaches using English as medium of instruction. Student discussants said: "*we have language difficulty and we are unable to understand what is learnt and written in English*". The other problem mentioned by both PTA and students too is students don't study and they have no interest for learning. In supporting the above idea, one student said: "*studying by its very nature may create discomfort and stress on oneself and nobody needs that*".

Here, both group of the participants agreed that students are not motivated and lacks readiness to learn and their level of understanding what the teacher teaches in the class room is very low and students do not have pre-requisite knowledge that resulted in low academic learning motivation. At the end, PTA and student participants said: "*students have no interest to learn; have no confidence and they are only waiting for cheating*". There is one saying which is reported by FGD participants *"is there special room for educators. Does a man with education have a specific room that a man without education loses?"*

3.4 Teacher Related Factors that Affect Students' Academic Learning Motivation

According to Bayraktar's (2015) in order to create an effective teaching and learning atmosphere in a classroom, it has been achieved that teacher's effective use of methods, techniques, tools and materials in relevant teaching field has an important effect on student motivation. Mendes (2003) also emphasized that an effective classroom environment, which enhances the motivation of the students, should be sufficient for the teaching methods and techniques of the educators. By using exciting and unique teaching techniques during training, the trainers better adapt the students to the lesson, which enables them to get the motivation for success (Bolkan and Goodboy, 2010).

Table 10 Descriptive Statistics on Teaching Methods

Statements	N	Min.	Max	Mean	Std. Dev.	Grand Mean
Apply different teaching methods and strategies	267	1	5	3.75	1.070	3.81

Use appropriate teaching aids	267	1	5	3.93	0.994	
Makes topics interesting	267	1	5	4.22	0.769	
Establish student centered learning environment	267	1	5	3.81	0.958	
Integrate education with real life	267	1	5	2.12	1.029	
Provide appropriate homework and assignments	267	2	5	3.97	0.882	
Make students clear about the expected objectives of the course	267	2	5	4.18	0.771	
Apply various assessment techniques	267	1	5	4.10	1.249	
Provide appropriate feedback	267	2	5	4.12	0.850	
Support those students who are in need of support	267	1	5	3.98	0.957	

Source: Own survey

Except the one item that was presented above (integrate education with real life) all items have a mean score of approximately 4. It indicates majority of the respondents agreed with the remaining nine statements that are shown in the above table. This shows that there are teachers who were using various teaching methods. Finally, the qualitative findings in relation to factors that affect students' academic learning motivation are presented below.

As per the information obtained discussants though there are some teachers who view teaching profession as the most important and significant job and do their best and committed in the preparation and delivering subjects given, contrary, now a day's some teachers are not taking teaching as serious promising profession they consider it as their last option. So, most teachers are trying to get another job which is more advantages and less stressful.

In such a way there are teachers who couldn't guide and improve students' learning and progress, they couldn't work for their professional development and become less effective in working towards achieving school goals. It was realized that most teachers see teaching as a burden and they couldn't become role model for students. One teacher member of PTA said: "*teachers don't have interest for teaching and they don't love their profession … we teachers are not as such interested in our profession and we are not committed to read rather we need to change our profession by*

learning other fields like Accounting and Management to improve our life economically" In similar discussion, the other participant said: "*even media is not inviting educated persons for their opinion instead it invites those who are rich and famous in acting*".

Indeed, students didn't deny the presence of few outstanding teachers in elementary schools but most of them are not well prepared, they do not have ample knowledge, and they are not supportive and friendly as said by student discussants. One student participant said that "*most of my teachers are very aggressive they just need a simple issue to insult, punish and to make out from the class*". As students said: "*there are teachers that make students to feel boring while teaching that make students to have low interest for learning*".

Another problem explained by student participants is lack of punctuality from some teachers that results inability to cover the subject given on time. One student said: "the*re are teachers who enter to class after 30 minutes passed*". As per the participants saying carelessness is seen from some teachers' side. One of the students participant said *"any teachers are unwilling to help students in the classroom.* In response to the students' questions, they said, *"Read by yourself for further understanding!. It doesn't concern me. It is not my business yet"rather than providing helpful criticism".*

The focus group discussion result revealed that few teachers in elementary schools didn't use active learning methods. One of the students said: "*albeit it is not work for all, there are teachers don't use active learning methods though we want to participate and engage in the teaching learning process they don't give us the chance to participate, their teaching is very boring and not interactive in which some of us sleep while they teach us*".

3.5 Administrative Related Factors that Affect Students' Learning Motivation

Administrative-related factors include factors that are generally experienced in a school setting with respect to school administrators, such as create conducive teaching learning environment, regularly follow up students and teachers, make the necessary teaching aids ready on time, establish clear rules and procedures, motivate students through different techniques, have leadership and management ability, and respond to inappropriate behaviors quickly.

Table 11 Descriptive Statistics of Administrative Related Factors

Items	N	Min.	Max.	Mean	Std. Dev.	Grand Mean
Create conducive teaching-learning environment	267	3	5	3.98	0.785	3.91
Regularly follow up students and teachers	267	3	5	4.05	0.734	
Make the necessary teaching aids ready on time	268	1	5	3.66	1.374	
Establish clear rules and procedures	267	3	5	4.24	0.683	
Motivate students through different techniques	267	1	5	4.00	0.834	
Have leadership and management ability	267	2	5	3.81	0.875	
Respond to inappropriate behaviors quickly	267	1	5	3.66	0.918	

Source: Own survey

From the questionnaire filled by teachers finding the mean score of each of the seven items was nearly 4. This implies that school administrators created conducive teaching learning environment, regularly follow up students and teachers, make the necessary teaching aids ready on time, established clear rules and procedures, motivate students through different techniques, motivate students through different techniques, had good leadership and management ability, and responded to inappropriate behaviors quickly. However, the qualitative data presented below contradicts the quantitative data.

As per leader's role in creating conducive situations for students and teachers; **s**tudents said that administrative staffs are not working hard to create a conducive environment for students like fulfilling library books and laboratory materials instead of creating condition for the conflict between teachers and students.

Students said: "*administrators call us for meeting to reveal things to be improved from teachers' side by saying that is secret and honestly, we tell the reality but teachers become angry and complain on us on the next day for what we said so…that is the only thing they did and this in turn create poor relationship between the teachers and us instead of improving things in a better way. Administrators don't guide students fairly, positively and properly about exams*. Some of student participants said: "*text books are difficult, they are not easily understandable, and supported by examples and detail descriptions….in addition there is lack of reference books in the library that is expected to be fulfilled by leaders*".

The qualitative result also revealed that majority of the students especially males are practicing different illegal and inappropriate activities like substance use (drinking alcohol, chewing Chat, smoking cigarette and using other illegal psychoactive drugs like Ganja) as a result of the ease availability of those drugs around the school compound.

There was also administrators' problem of reporting the students' progress for their parents. PTA members explained that beyond students' low academic motivation to learn, parents don't make control, monitor and supervise their children's learning, progress, and behavior at home or by going to schools and discussing with different school concerned bodies. They said: "*parents have no hope about the futurity of their children since there is no job opportunity for their elder graduated children that aggravate their poverty"*.

In this regard, respondents reflect that University and College graduates spend most of their day time by setting around the environment where they are living. In addition, there are some careless and not committed parents for children learning ... "*What do I benefit as a parent from my immense contribution in assisting my boy or girl? What I earned personally as a father? The village is starting to produce young people without jobs who are used to sit on hard seats"* **.**

Finally, PTA participants reported lack of discipline, readiness, knowledge, skill, preparation and commitment from most teachers' side. And also, the reported poor relationship and lack of respect among teachers, students and administrators might be the factor for students' low academic learning motivation.

4 Conclusion

In this study the result reveled that students did not have high value of learning. Students had low learning desire and they did not have belief towards education as means for living a better life in the future. Students also did not believe in their own ability to perform well in learning tasks and they did not believe that their efforts lead to success. This made them not to take an active role in using a variety of learning strategies and they did not actively participate and ask questions when they appear confused.

Thus, in this study researchers found that students' academic learning motivation was low. Many factors seemed to impede students' academic learning motivation such as the types of activities the

teacher used, the low amount of energy students exerted, and internal and external distractions. Based on findings, students' learning goals, self-efficacy, learning strategies and perception of learning values were identified as important domains in students' academic learning motivation.

The results also showed that all the teaching strategies are not equally motivating. Students with lack of academic motivation to achieve academically have no desire to learn, and little willingness, or energy, to take action towards achieving in their academic tasks. When students lack motivation to achieve academically, they do not complete tasks, such as schoolwork or homework or projects. They develop an apathetic, "*don't care"* attitude, with little desire to change. They appear bored, tired, and they perform poorly in their tests and examinations. Students who lack motivation are at risk of not fully developing their rich academic talents. This problem is especially evident with some students of high academic ability.

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Declaration of competing interest

The authors declare that there is no conflict of interest in this study.

Authors' contribution

Authors contributed equally.

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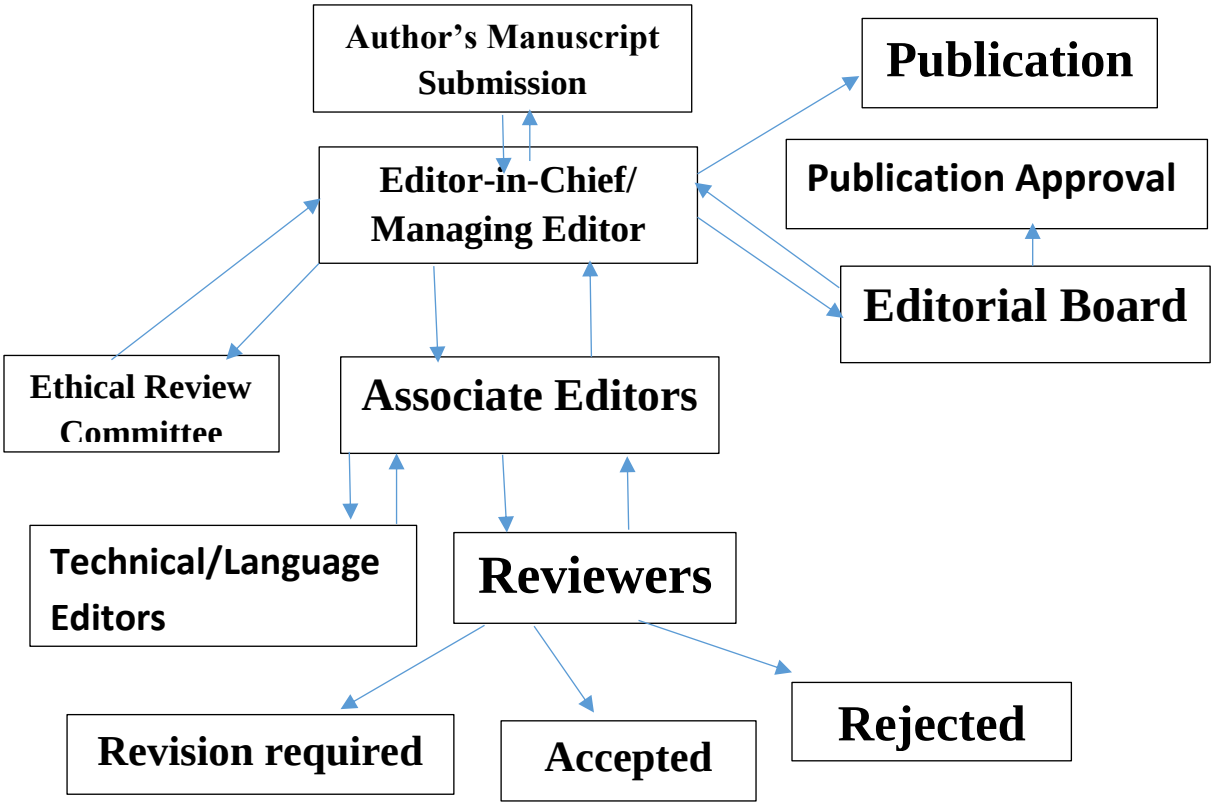

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