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# Public Engagement: Talking Science to Laypersons as Perceived by Postgraduate Students in Jordan

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**Abstract**
This study aimed at investigating how and why to engage laypersons with science as perceived by postgraduate students in Jordan. A questionnaire consisted of (24) items, with 5 point Likert-Scale was used after conducting the validity and reliability of the questionnaire. Findings showed that the respondents showed positive perception towards engaging laypersons in science as it is vital for their daily life and using technology properly, and the importance of using layperson knowledge in communicating with them. Finally scientists need practice and knowledge to communicate with laypersons.

## Introduction

Long time ago science just used logical thinking; hands-on activities were not allowed. Scientists suffered and faced challenging times in their life, with many jailed and others killed. It was Thomas Bacon (1561-1622) who started talking about the practical aspect of science. He used his power during his work in the royal palace of the king at the time, and was very brave to mention hands-on activities. We can say that science was created in the elbows of scientists. Science is defined as knowledge and process. Knowledge is the concepts, facts, laws, principles and theories, while process is the basic and integrated science process skills, such as observing, predicting, operational definitions etc. Technology is the product of science, so science produces technology, while technology produces new scientific knowledge.

The main aim of science should be to improve, protect, and change the quality of human life, rather than destroy or degrade it. The rapid development of science could cause some threats to human life. Products of science could cause some kind of dangers to the people, but it is possible that some of these problems could have been avoided if lay people had been involved in the science and its application. This does not mean that science has improved human life.

Science and its application is *of* people, *by* people and *for* people (Bakuwa, 2014). There is a need for people to understand science to a certain depth not as scientists themselves. People

need to know the ways of selecting choices (*Merz,Fischhoff ,Mazur, &Fischbeck (1993)*). That knowledge might include just estimates of some outcomes (e.g., amount of farm products, health costs). Or, it might require enough knowledge to understand why the experts make those estimates (*Bruine , Bruine , and Bostrom (2013*). Knowing that science allow members of the public to follow future improvement in the products of science. (Lupia , *2013*, Reyna *2012).*

This means that human will be the users of science and producer of science products (technology). A long time ago scientific experts carried out the development of science, such as engineers and technologists, while society was at the receiving end. It is important for everyone, but the general public lack an understanding of different parts of knowledge such as (concepts, scientific facts, and scientific theories) and the real methodology used by scientists.

**Background of the Study**

There is a real gap in the understanding of what most scientists do, and how their work relates to the real world, as seen from the perspective of the lay person. It is of great value that scientists should communicate the importance and value of their work to the community. This is an art that needs to be practiced, as scientists need to avoid technical details in order to summarize the body of their research in a very short time. So this study came to elucidate why and how to communicate with laypersons as perceived by postgraduate students at Jordan.

**Study Objectives**

This study aimed at investigating the following questions:

a) Why scientists should interact with lay people and the public as perceived by postgraduate students?
b) How to communicate with lay people and the public as perceived by postgraduate students?

**Literature Review**

In 1995 Carl Sagan (1934-1996) as cited in (Bakuwa, 2014). Said that “We've arranged a global civilization in which the most crucial elements…profoundly depend on science and technology. We have also arranged things so that almost no one understands science and technology. This is a prescription for disaster. We might get away with it for a while, but sooner or later this combustible mixture of ignorance and power is going to blow up in our faces”.

A study by the “Pew Research Center” in the USA showed that 87% of 3748 American–based scientists connected to the “AAAS” agreed with the statement that “Scientists should take an active role in public debates about the importance of science and technology”. Only 13%

supported the opposite statement that "Scientists should focus on establishing sound scientific facts and stay out of public policy debates".

AAAS, Project 2061, and Science for All Americans: "The life enhancing potential of science and technology cannot be realized unless the public in general comes to understand science, mathematics, and technology and to acquire scientific habits of mind; without a scientifically literate population, the outlook for a better world is not promising, but most Americans are not scientifically literate. …The United States should be able to do better."

Science is a vital way in representing the nature of science (Irwin & Wynne, 1996). The real argument for understanding science is clearly presented by the United Kingdom's Royal Society Report (1985)—also known as the Bodmer Report—which states that: "…better public understanding of science can be a major element in promoting national prosperity, in raising the quality of public and private decision-making and in enriching the life of the individual…Improving the public understanding of science is an investment in the future, not a luxury to be indulged in if and when resources allow" (The Royal Society, 1985: 9). Analysis and identifying are the few scientific results that people need to know among the scientific knowledge that it would be important to know (von Winterfeldt , 2013, Raiffa 1968)). Scientists should start with the most valuable fact and then their benefits. (Kahneman (2011). Although one can formalize such analyses (Merz, Fischhoff, Mazur And Fischbeck, 1993; von Winterfeldt ,2013; and Raiffa 1968), in fact the matters that are important to scientists are also important to public. (Dietz ,2013; Schwartz and Woloshin , 2013; Raiffa, 1968; Lupia, 2013; Von Winterfeldt. 2013).

**Research Methodology:**

**Sample of the study**: (128) of the postgraduate students at Yarmouk University were selected and answered the questionnaire

**Instruments:** A questionnaire was developed, it has 25 statements following 5 points-scale Likert scale, (strongly agree, agree, neutral, disagree and strongly disagree), were divided into two main domains (Why to interact with laypersons and how to interact with the laypersons), validity and reliability were conducted using face and content validity, while cronbach-α for internal consistency was calculated and it was (0.83).

**Findings and Discussion:**

The results and discussion will be presented according to the sequence of the objectives as follows:

**Findings and discussion of Objective 1:** Why scientists should interact with lay people and the public as perceived by postgraduate students?

Table (1): Means and standard deviations of postgraduate student's responses on why to engage laypersons with science

| Domain | Statements | Means | Standard deviations |
|---|---|---|---|
| Why to engage laypersons with science | I believe that science engagement with laypeople will improve their daily life | 3.68 | 0.82 |
| | I believe that science engagement with laypeople will help them to use technology easily | 3.68 | 0.74 |
| | I believe that science engagement with laypeople will help them solve problems they face in their daily life | 3.73 | 0.74 |
| | I believe that science engagement with laypeople will help them to understand the value of science | 3.67 | 1.06 |
| | I believe that science engagement with laypeople will help them use tools and equipment in their daily life | 3.64 | 1.18 |
| | I believe that science engagement with laypeople will help them communicate with their neighbors and friends | 3.51 | 1.01 |
| | I believe that science engagement with laypeople will help them change their values and attitudes towards science | 3.51 | 1.o2 |
| | I believe that science engagement with laypeople will Improve their health | 3.51 | 0.88 |
| | I believe that science engagement with laypeople will Improve their critical thinking | 3.47 | 0.95 |
| | I believe that science engagement with laypeople will Improve their trust in new technology | 3.45 | 0.99 |
| | I believe that science engagement with laypeople will Improve their trust in natural phenomena | 3.44 | 1.08 |
| | I believe that science engagement with laypeople will Improve their trust in the new inventions | 3.42 | 0.89 |
| | Total | 3.56 | 1.03 |

***highest value 5.0**

As shown in Table (1) the means of postgraduate responses came between 3.86 and 3.42, out of 5 or 73.6%-69.0% and overall percentage of 71.2%. Lay persons should be able to understand the basics of science to make correct decisions. Because science communication seeks to inform decision making, it must listen to the people, to identify the problems that its members face—and, the information they need. While science education begins by hearing to scientists and learning the facts that they wish to present, Klahr (*2013)*. One of the examples of the negative consequences of poor communication between scientists and the laypersons is the issue of climate change. (Somerville and Hassol, 2011). Some studies (Wynne 1989, 1991, 1996; Irwin and Wynne, 1995) have demonstrated knowledge that complements that of science experts. For example, Wynne (1989), in his study of the relationship between the Ministry of Agriculture and Fisheries (MAF) and Cumbrian sheep farmers after the Chernobyl disaster, found that sheep farmers knew more about the effect of radioactivity on their local environment and sheep farming than scientists. Wynne (1989, 1991) argues that scientists should not show that they knew everything, and concentrating on the layperson ignorance of science, but that they should learn from the public, culture, and people's

experience. In Jordan as an example some farmers have better knowledge about olive trees than some agriculture engineers, as they deal with these trees as their babies, from sawing them till they grow up. It is clear that it is important to engage laypersons with science as it is important in their daily life, using and trust in technology, and help them to in problem solving.

**Findings and discussion of Objective 2:** How to communicate with lay people and the public as perceived by postgraduate students?

Table (2): Means and standard deviations of postgraduate student's responses on how to engage laypersons with science

| Domain | Statements | Means | Standard deviations |
|---|---|---|---|
| **How to engage lay-person with science** | I believe that scientist should use simple and clear words | 3.45 | 0.83 |
| | I believe that scientist should use their students and assistants to interact with laypeople | 3.44 | 0.96 |
| | I believe that scientist should Be close and build good relations with laypersons | 3.43 | 1.29 |
| | I believe that scientist should not go deeply in scientific explanations | 3.4 | 1.12 |
| | I believe that scientist should Use social media to explain scientific concepts | 3.25 | 1.03 |
| | I believe that scientist should Use newspapers and media to explain scientific concepts | 3.2 | 1.17 |
| | I believe that scientist should Use lectures and seminars | 3.2 | 1.05 |
| | I believe that scientist should dialogues and metaphors | 3.19 | 1.02 |
| | I believe that scientist should Cooperate with other scientists all over the world | 3.17 | 1.07 |
| | I believe that scientist should Use journals and stories | 3.13 | 1.00 |
| | I believe that scientist should use Science fictions | 3.11 | 1.18 |
| | I believe that scientist should use Conferences and symposiums | 2.95 | 1.16 |
| | Total | 3.24 | 1.16 |

***highest value 5.0**

Table (2) shows that the perception of postgraduate students range from 3.45 to 2.95 out of 5, with average percentage of 64.8%. Communication to a lay person audience is difficult. Scientists should know how to communicate, meanwhile communication is not an easy process especially with lay people. Some scientific ideas are too complicated so to present and communicate with laypersons becomes too difficult. Real communication skills need extensive training and practice in order to communicate to lay people. It is clear as perceived by postgraduate scientists should use different strategies and ways to communicate with laypersons as follows:

a) Simplify (break down the concept): It is a real mistake when scientist's breakdown the concept to layperson and oversimplify it. Also the overestimation of their knowledge can leave them confused and form misconceptions among them.
b) Follow the funnel model: This means to start from broad concept then go down to narrow concept. This way you will increase the layperson attention to the subject you are going to describe. Finally make conclusion of your results.
c) Storytelling: Storytelling in science is the best way for layperson attention to science subjects. Analogies or metaphors will allow layperson to engage with your scientific ideas.
d) Use friends/family and your neighbors to your advantage: practice your spiel on family members or friends and take their feedback. Give your attention to what they face difficulty to understand and try to tailor your story according to their knowledge. Alternatively, sometimes you need to use text and drawings to explain some scientific ideas.
e) Speaking to the media: Scientists must speak with the media and the key points to remember:
   Be confident, because you are the high knowledgeable person.
   Say no if you are not sure of the scientific concept.
   Reflect on what you want (or do not want) to be on record days, months or years later, and use that as a filter.
f) Social media. can be tricky, but on balance it is good for science communication, as long as you are able to deal with.
g) Don't turn your nose up at laypersons who choose to take their knowledge beyond journals or conferences. Current and future challenges: As much as we understand the current and future challenges associated with our changing life, it is a struggle for many layperson to see beyond simple scientific concept which affecting their daily life. The science communicator must keep this in mind and find ways to relate the message to the core values of the layperson.

## Conclusion

Communications are useful if they reach people with the information they need and they can use. This requires collaboration between scientists with subject matter knowledge to communicate and scientists with expertise in communication processes—along with laypersons. Such collaboration affords the sciences the best chance to tell their stories It is clear that there is no doubt about the importance of communicating with laypersons, and communicating with them is not an easy it needs experience and special skills of communication in addition of using different strategies, methods in communicating with them. Companies should play an effective role in social responsibility. Train scientists in how to communicate with laypeople. Universities and colleges should also train scientists on how to communicate with laypeople.

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# Enhancement of Mathematical Communication Competency Upon Students of Junior High School Through Contextual Learning Based on Coastal Culture

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**Abstract**
Various studies have pointed out that communication in mathematics is one of the necessary competencies in learning mathematics. Students are expected to possess such competency in order to communicate learning materials in an efficient and effective manner which is supposed to create easiness for students to learn. A particular learning approach which is allegedly to enhance mathematical communication competency is the contextual learning based on coastal culture. This research was conducted by undertaking mixed method with sequential explanatory strategy. Design of study is pretest-posttest control group design. The population is students of Junior High School in East Flores District, Province of East Nusa Tenggara with 119 students as sample. The sampling technique is purposive sampling. Four separate classes of class 8 of Junior High School in Larantuka were randomly selected to be distinguished as an experimental class and a control class. The instrument of this study is a test of mathematical communication competence. Results show that there is an enhancement in mathematical communication competency upon students of the group which were learning through contextual learning based on coastal culture (CLBCC) and conventional learning approach (CLA). Learning outcomes and enhancement in mathematical communication competency of the CLBCC group were found to be higher than those of the CLA group. For both groups, the lowest average enhancement was upon the indicator of expressing a certain situation or mathematical relationship into mathematical models (graph, figures, and mathematical expressions). The highest average enhancement was found upon the indicator of outlining significance upon given situation or problem, which occurred within both groups.

**Keywords**: Mathematical Communication, Contextual Learning, Coastal Culture

## 1. INTRODUCTION

Communication is significantly important in the learning process as it determines the success of transferring information of knowledge and experiences between teachers and students, students and students, and between students and learning materials. Furthermore, communication allows individuals to express the ideas and thoughts. Mathematics ideas, which have been derived and expressed through mathematical languages in figures, graphs, texts, and mathematical models, have been designed to be comprehensible to the audience. This utterance is parallel to those of Jamison (Kabael, 2012) who argues that mathematical language is composed by logical structure and rhetoric which is comprehensible towards all parties and is presented based on definition formats, proof, and theory. Conveying mathematical ideas clearly and accurately presents irrefutable significance.

Since an early age, children are encouraged to comprehend and express mathematical facts, thoughts, and ideas that they possess. This allows children to be accustomed to express mathematical ideas in accurate and correct manners in such a way to be comprehensible to the audience. Children should be trained to express mathematical ideas in mathematical sentences in order to simplify problems and solutions. This confirms to NCTM (2000) which underlines that communication in mathematics is an utmost significance and therefore, should be exposed to children at an early age.

Besides, the importance to be comprehensible to the audience communication is beneficial to evaluate the correctness of thinking. Through communication, the correctness of mathematical ideas by students can be evaluated by their peers as well as their teachers. Through this medium, students will be encouraged to realize their mistakes in mathematical thinking and therefore, will be encouraged to undertake correction. This statement confirms to that of NCTM (2000) which utters that communication enables mathematical thinking to be observable and encourages students to reflect upon self-mathematical thinking as well as mathematical thinking of others.

The importance of communication is underlined by the National Council of Teachers of Mathematics (NCTM, 2000, 29), which suggests that in learning mathematics, there are four competencies ought to be attained by the student. They are problem-solving, reasoning, communication and representation.

In accordance to NCTM, within the Decree of Indonesian Minister of Education Number 22 Year 2006 regarding standard contents of mathematics, The 2013 Curriculum set out in Decree of Indonesian Minister of Education Number 64 Year 2013 regarding standard contents of the 2013 curriculum, and Decree of Indonesian Minister of Education Number 65 regarding the 2013 curriculum process standards, it is stated that aims of mathematics learning are upon the following: (1) solving problems which comprise ability to comprehend to problems, design mathematical model, solve upon the model, and interpret the solution; (2) communicating ideas with symbols, tables, diagrams, and other mediums to clarify certain situations or problems; and (3) possessing attitudes in respecting practicality of mathematics in daily life, which comprises of possessing curiosity, concerns and interests towards learning mathematics, alongside being tenacious and confident in solving mathematical problems.

Recalling the significance of mathematical communication competency, it is therefore required particular mathematical learning strategy which has the potential to increase mathematical communication competency. One of the strategies which have the potential to increase mathematical communication competency is contextual learning based on coastal culture (CLBCC).

Mathematical learning is an effort to develop mathematical competencies requires a strategy that emphasizes the role of students in maximizing their activity. Learning should involve students in the search for meaning through the use of an environmental context. Unnecessary concepts will not be stored well in the student's memory. Therefore, learning must be based

on the idea that meaning arises from relationships between content and context. Context gives meaning to content. The more skilled the students associate the lesson with the context, the more meaning they gain from the lesson.

The above exposure indicates that the importance of context in every learning implementation. Contextual learning is referred to as contextual teaching and learning (CTL). In this learning, all student activities are related to the subject matter and real-life context they find. This means that students seek meaning in finding interesting mathematical problems, seeking information and drawing conclusions, actively selecting appropriate strategies, composing, planning, investigating, questioning, and making conclusions about solving a mathematical problem, and linking mathematical concepts learned to the context in life situations.

The illustration above shows that mathematical communication competency is an utmost significance ought to be possessed by students in learning mathematics. Therefore, it is required a study which analyzes mathematical communication competency of students, especially those being prepared to be teachers of mathematics. These students righteously possess mathematical communication competency to convey information in an effective and efficient manner which eases students into learning.

Derived from the above introductory, the problem of this study is formulated as: (1) Are there differences upon outcomes of mathematical communication competency between a group of students of contextual learning based on coastal culture approach and group of students of the conventional learning approach? (2) Are there differences upon enhancement of mathematical communication competency between a group of students of contextual learning based on coastal culture approach and group of students of conventional learning approach? (3) Which indicator of mathematical communication competency of students resulted to be the highest? (4) Which indicator of mathematical communication competency of students resulted to be the lowest?

Aim of this research is to identify: (1) differences upon outcomes of mathematical communication competency between group of students of contextual learning based on coastal culture approach and group of students of conventional learning approach; (2) differences upon enhancement of mathematical communication competency between group of students of contextual learning based on coastal culture approach and group of students of the conventional learning approach; (3) The highest and the lowest indicator of student mathematical communication competency.

## 2. LITERATURE REVIEW

### 2.1 Mathematical Communication Competency

Communicating upon and through mathematics is part of learning to become a problem solver of mathematics and learning to think mathematically. Communication can be developed to encourage students to use their own words in expressing their own ideas, and to record their thoughts in various mediums such as through words, symbols, diagrams, and models.

Mathematical communication competency is identified as the ability to comprehend and express mathematical facts, thoughts, and ideas (Dan, 2013). Previously, Sumarmo (Koswara, Sumarmo, Kusumah, 2012) analyzed upon various experts' suggestions thus concluding that characteristics of mathematical communication competency comprise of: (a) constructing real objects, figures and diagrams into mathematical ideas; (b) explaining mathematical ideas, situations, and relationships by oral and written expressions, or by means of real objects, pictures, figures, and algebra; (c) explaining daily events in mathematical symbol languages; (d) listening, discussing, and writing upon mathematics, comprehensive reading on mathematical presentations; (e) explaining and drafting questions upon learnt mathematical materials.

The explanations on mathematical communication competency above comprise two main points which are representing mathematical ideas correctly in the form of figures, graphs, and algebra and expressing mathematical ideas by oral or written expression which would be easy to comprehend by its audience. Representation is a means of structuring certain situations thus creating a more meaningful expression. The audience is bound to comprehend to a particular concept if it were top be communicated incomprehensible and appealing fashion.

NCTM (2000) suggests that indicators of mathematical communication competency in mathematics learning comprise of: (1) Ability to express mathematical ideas through oral and written expressions, and to visually demonstrate and depict them; (2) Ability to comprehend to, interpret, and evaluate mathematical ideas correctly in oral and in other visual terms; (3) Ability to utilize mathematical terms, notations and its structures to present ideas, picture relationships and situational models.

In detail, mathematical communication indicators in mathematics learning are identified as (1) constructing real objects, figures, and diagrams into mathematical ideas; (2) explaining mathematical ideas, situations, and relationships by oral and written expressions, or by means of real objects, pictures, figures, and algebra; (3) explaining daily events in mathematical symbol languages; (4) listening, discussing, and writing upon mathematics, (4) reading written mathematical presentation and drafting relevant questions; (5) constructing conjectures, composing arguments, crafting definitions and generalizations; (6) explaining and drafting questions regarding the learned mathematics (Sumarmo, 2003).

The indicators of mathematical communication competency described above are the indicators of mathematical communication competency which generally used for middle school learning. Recalling that this research is conducted among university students, alongside circumstances of literature shortages, therefore indicators of mathematical communication competency throughout this study is formulated as (1) expressing a particular situation or mathematical relations into a mathematical model form (graph, figure, and mathematical expression); (2) constructing particular problem or case out of a certain mathematical model (graph, figure, and mathematical expression); (3) describing meaning of a particular given situation or problem.

### 2.2 Contextual Learning Based on Coastal Culture

Contextual learning is learning uses a contextual approach that takes place naturally in the form of work and experience. In this learning, students are trained to experience a process of relating learning materials to the real-world context experienced by everyday students. In contextual learning, there are seven main components: (1) constructivism, (2) questioning, (3) inquiry, (4) learning community, (5) modeling, ; (6) reflection, and authentic assessment.

Constructivism means students construct new knowledge based on initial knowledge through a process of social interaction and assimilation-accommodation. The first stage of learning is the learning community. Students are divided into groups. The division of groups aims to motivate students to share information, discuss and work together in groups.

Questioning in CTL is done by teachers and students. Questions posed by teachers aim to encourage, guide and assess students' thinking abilities. While questions asked by students related to the lack of understanding of the concepts studied. Blakey and Spence (Toit & Kotze, 2009) state that learners should ask themselves what they know and what they do not know early in the learning activities. Questions for oneself in learners are an indicator of whether they understand the concepts being studied.

In mathematics learning, modeling is an important aspect. This is because in mathematics phenomena in everyday life must be expressed in mathematical models to be easily solved. However, it is realized that the ability of learners in translating daily phenomena in mathematical models is still low. Muijs & Reynolds, Killen, (Toit & Kotze, 2009) assert that modeling occurs when the teacher demonstrates the processes involved in performing difficult tasks, or when the teacher informs students about their thinking and is motivated to choose a particular strategy when solving the problem. Modeling and discussion enhance the thinking of learners and talk about their own thinking (Blakey & Spence, 1990).

The inquiry is a process that finds concepts, principles, knowledge that begins with the giving of contextual problems. The process of finding can be done in group discussions as well as after discussion. Ruseffendi (2006) points out that one of the goals of learning by inquiry is that students learn the scientific method through finding and applying it in other situations. After that, students are directed to do reflection can be done through the activities of recording what has been studied, asked, made a journal, and discussion to improve students' understanding of the various concepts learned.

Reflection aims to check how students understand the mathematical concepts learned. The ability to reflect is a prerequisite for articulation and articulation itself requires the identification of the essentials of an action. Students can reflect on what they have done based on important aspects of their thinking and actions.

Contextual learning based on coastal culture will lead to a cultural awareness because this lesson it integrates contextual issues of culture and the environment. In addition, integrating contextual problems of culture and environment in the learning of mathematics through contextual learning based on culture is expected to improve students' mathematical ability.

Learning with coastal-based contextual issues is important to note. For coastal communities, contextual learning without regard to the environment in which they live will result in their dislike in learning mathematics. This makes them further away from math. For learning that relates the context of everyday life with the concept of mathematics must provide a positive contribution to the improvement of mathematical ability and love of the environment and culture.

## 3. METHODS

This research undertakes a pretest-posttest control group design (Creswell, 2009). Group of the experiment is treated with contextual learning based on coastal culture approach, whilst a group of control is treated with conventional learning approach. The population of this research accounts for all students of grade 8 in East Flores District. The research sample was filtered as 119 students who were selected through a purposive sampling technique. Initial competency of both groups was homogenous. Research instrument is tested on mathematical communication competency. Quantitative data were analyzed through the descriptive and inferential approach in regards to outcomes and enhancements of mathematical communication competency. Hypothesis testing undertook parametric and non-parametric statistical analysis.

## 4. RESULT AND DISCUSSION

### 4.1 Outcome of Mathematical Communication Competency

The hypothesis of difference tests upon mathematical communication competency outcomes are as follows:

$H_0$ : There is no difference in outcomes of mathematical communication competency amongst groups of different learning approaches.

$H_1$ : There is the difference in outcomes of student mathematical communication competency amongst groups of different learning approaches.

Results of significance test employing a t-test are presented in Table 4.1.

**Table 4.1**
**Difference Test of Mathematical Communication Competency Outcomes between 2 Test Groups**

| Approach | N | Avg. | Avg. Dif. | *t* | df | *Sig.* | Declaration |
|---|---|---|---|---|---|---|---|
| CLBCC | 59 | 24.15 | 7.28 | 4.50 | 63 | .000 | $H_0$ rejected |
| CLA | 60 | 16.88 | | | | | |

Based on the t-test results presented in Table 4.1, the value of probability (sig.) is lower than $\alpha = .05$, and therefore $H_0$ is rejected. This signifies that the group of students being taught through the contextual learning based on coastal culture approach yield higher outcomes in

terms of mathematical communication competency than those students of the conventional learning approach group.

### 4.2 Mathematical Communication Competency Enhancement

Different test upon mathematical communication competency enhancement between two groups undertakes the following hypothesis:

$H_0$ : There is no difference enhancement upon mathematical communication competency between two groups of different learning approaches.

$H_1$ : There is difference enhancement upon mathematical communication competency between two groups of different learning approaches.

Results of significant test employing a t-test are presented in Table 4.2.

**Table 4.2**
**Different Test of Mathematical Communication Competency Enhancement Between 2 Test Groups**

| Approach | N | Avg. | Avg. Dif. | *t* | dof | *Sig.* | Declaration |
|---|---|---|---|---|---|---|---|
| CLBCC | 59 | 0.71 | 0.22 | 4.83 | 63 | 0.000 | $H_0$ is rejected |
| CLA | 60 | 0.58 | | | | | |

As depicted in Table 4.2, the t-test results identify a rejection towards $H_0$ as the probability value (sig.) is lower than α (.05). By this, it is concluded that the group of students of the contextual learning based on coastal culture approach yield higher average enhancement of mathematical communication competency than those students of the conventional learning approach.

Enhancement in mathematical communication competency for both test groups generally lies on the average scale, however, enhancement for the contextual learning based on coastal culture group were higher than the conventional learning group. Within the metacognitive approach, students are conditioned to explore and study upon various learning sources, identify constraints, self-construct questions, answer questions and utter ideas. These particular activities trigger students to explore their insights which would ease students in delivering upon ideas in regards to working on given tasks. Through a comprehensive study of various learning materials, students are deemed to be more enhanced in comprehending to materials and therefore, will be more confident. Identifying and comprehending to the process of work completion from various sources enriches student's knowledge and in turn, boosts their confidence to communicate.

The contextual learning based on coastal culture approach encourages students to construct questions, answer questions and deliver ideas in discussions. These activities trigger students to employ their current knowledge in expressing a situation. The mere activity of delivering ideas within a discussion eases students in completing on given tasks. Browsing for solutions

upon various sources allows students to make significance on what is being learned and to express ideas comprehensible to the audience.

Interview results suggest several external factors that affect students mathematical communication competency. These factors are amongst the heavy workload of tasks given by teachers, shortages of access to learning sources, fatigue, relationships between students and between students and teachers, and academic atmosphere. Heavy workloaded tasks pinned on students by teachers leads to student fatigue. Deadline of task submission is deemed too short which heaps pressure on the students. This particular condition would indeed result in physique and mental fatigue. A tired physique would convey a lapse in concentration in learning activities within mathematical statistics subject. A decline in concentration would result in low comprehension of students towards learning concepts thus leads to the low competency of mathematical communication.

Within the contextual learning based on coastal culture, students are guided to self-identify learning concepts. This method pushes students to study from various references to learning resources. Difficulty in obtaining references is one of the constraints experienced by the students. The school library does not provide sufficient sources and literature. Access to references from the internet is unlikely to be experienced by the students due to an insufficient internet connection and frequent power outages, adding to costly internet accesses. In this case, students are bound to constraints in access to a wider source of alternative learning materials.

Learning atmosphere in the classroom is found to be one of the factors affecting student learning activities. A quiet and serene atmosphere is expected to support learning activities. Mutual interactions in assisting and respecting each other would convey positive contributions towards enhancing mathematical communication competency. A high intensity of interactions would be a significant contribution by students in creating a better learning atmosphere.

In regards to comparing pretest scores between BLBCC and CLA groups, average score upon the three indicators do not show considerable differences, whereas posttest scores comparison show relatively major differences. Upon indicators (1) and (2), enhancement of mathematical communication competency (denoted by N-gain) of the BLBCC group decently differs from those of the CLA group, whilst for indicator (3), enhancements show similarity.

Interview results point out that students experience difficulties in working on tasks related to an aspect of expressing mathematical situation or relationship into forms of mathematical models (graph, figure, and mathematical expressions). This is taken on account of proper grammar constraints in expressing ideas. Students are found inferior due to the anxiety of using improper grammar in encountering with the researcher. This leads to varying cautious using of sentences by students.

## 5. CONCLUSION AND SUGGESTION

### 5.1 Conclusion

Referring to research results and discussions in the previous section, several conclusions are drawn as follows: (a) There are differences in outcomes and enhancements of students mathematical communication competency in general; (b) The enhancements of mathematical communication competency for both groups lie on an average scale, however, enhancements found upon the BLBCC group was higher than those of the CLA group; (c) The highest enhancement occurred for the outlining significance upon given situation or problem indicator; (d) Lowest enhancement occurred for the expressing mathematical situation or relationship into forms of mathematical models (graph, figure, and mathematical expressions) indicator.

### 5.2 Suggestion

Derived from the conclusions, several suggestions are uttered as follows. Contextual learning based on coastal culture approach in Mathematical Statistics subject enhances student competency in mathematical communication, and therefore the metacognitive approach should be considered as an alternative learning approach for students. Interview results pointed out practices of the metacognitive approach in regards to task workload and time allocation as considerable pressure, and therefore it is suggested upon consideration regarding workload and time allocated for students upon completing the tasks, as well as improving access to alternative learning sources. Research results identify contextual learning based on coastal culture approach to enhance mathematical communication competency in general, and therefore it is suggested upon further study related to contextual learning based on coastal culture approach towards other mathematical competencies.

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# Influence of Using Ball-And-Stick Models in Teaching Nomenclature to SS 3 Chemistry Students in Sabon Gari Local Government Area of Kaduna State

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**Abstract**
This research work investigates the influence of the use of Ball-and-Stick Models in teaching nomenclature to SS 3 chemistry students in Sabon Gari Local Government Area of Kaduna State. In this study, a Quasi-experimental research design was used with a nomenclature achievement test (NAT) as data collection instrument with two hundred and eighty five (285) respondents from six selected secondary schools with a total population of one thousand and ninety six (1096) students from Sabon Gari Local Government Area of Kaduna state chosen as sample using Sample Size Calculator with 5% confidence interval which is a public service of Creative Research Systems survey software. The analytical tools used for data analysis was the statistical package for social sciences (SPSS, Version 22). The result obtained shows that there is a significant difference between the performance of students taught naming organic compounds using ball-and-stick and that those taught with the chart, There is a significant difference in the performance of students taught naming organic compounds using ball-and-stick in respect to gender since the P value is of the alpha level of significance ≤0.05. The significant improvement in students' understanding can be attributed to their increased exposure to virtual and physical models and the active learning these students were engaged in. It is recommended that the government should inculcate incorporating a combination of virtual and physical models in chemistry teaching/learning as a means to foster meaningful learning and spatial understanding of molecular structure.

**Key Words:** Ball-and-Stick Model, Chemistry, Nomenclature, Teaching, Chemistry Students

## Introduction

Chemistry can be described at three distinct levels; namely, a) the macroscopic level (visible/touchable phenomena), b) the microscopic level (atomic/molecular), and c) the symbolic level (representing matter in terms of formulae and equations) (Hinton & Nakhleh, 1999). Students who are studying chemistry are supposed to think at the microscopic levels and explain changes at the macroscopic levels (Chandrasegaran, Treagust & Mocerino, 2008). Students are supposed to link 2D and 3D structures of chemicals to their physical

properties [such as the physical state (gas, liquid, or solid), the appearance of the chemical, boiling & melting points, density, state at room temperature, and color] and chemical properties (Enthalpy of formation, Flammability, Preferred oxidation state, Coordination number, etc.). All of these think should be "cooked" in mind.

Nomenclature and molecular structure are most frequently the first topics students come across in organic chemistry. Students encounter problems in learning nomenclature from the chemistry textbooks and from the teachers (Obumnenye & Ahiakwo, 2013). Lecturers in most colleges of education still use textbooks and 2D pictures to illustrate molecules. Many researchers claim that the use of still pictures enables the building of a mental model of new concepts and phenomena, while others claim that still pictures are not adequate and utilizing animated pictures is MUST for promoting conceptual understanding (Barak & Hussein-Farraj, 2012). Chandrasegaran, Treagust & Mocerino (2008) claim that students' ability to use macroscopic, microscopic, and symbolic representations is necessary for understanding chemistry concepts and phenomena. Students who are studying chemistry are requested to think at the microscopic level (in terms of interactions between individual atoms and molecules) and explain phenomena at the macroscopic level (Dori & Hameiri, 2003).

In the early practice of chemistry, the chemical name of a compound and its chemical formula had little or no relationship to one another. For example, the compound $(CH_3)_2CO$ was called Acetone. The name “Acetone" contains no information about the type or number of elements in the compound. Modern naming methods have corrected this lack of connection. Today's rules for naming chemical compounds are set by the Nomenclature Committee of the International Union of Pure and Applied Chemistry (IUPAC). Older names, such as acetone, are now generally referred to as common names. The correct IUPAC name for $(CH_3)_2CO$ or Acetone is Propanone.

Students' ability to write correct IUPAC names is central to learning and understanding chemistry. The West African Examination Council (WAEC), the body responsible for organizing examinations in West Africa, has for some time been concerned about students' inability to name inorganic compounds correctly systematically. The 2006 WAEC Chemistry Chief Examiner (CE) report stated that many candidates had problems with the systematic naming of inorganic compounds. Student difficulties with naming inorganic

compounds have resulted in their inability to write correct chemical formulae (CE report for 2001, 2004 and 2005).

Experimental students gained a better understanding of the model concept and were more capable of defining and implementing new concepts, such as isomerism and functional group. They were better capable of mentally traversing across four understanding levels in chemistry: symbol, macroscopic, microscopic and process. Experimental group students were more capable of applying a transformation from two-dimensional representations of molecules, provided by either a symbolic or a structural formula, to three-dimensional representations – a drawing of a model, and vice versa. Based on the research findings, it is recommended that incorporating both virtual and physical models in chemistry teaching/learning serve as a means to foster model perception and spatial understanding of molecular structure. Dori and Barak, (1999)

Raiyn & Rayan (2015) Research on How Chemicals' Drawing and Modeling Improve Chemistry Teaching in Colleges of Education they concluded that integrating modeling tools such as CHEMDRAW software in chemistry education is helpful. The improvement in the average score from 5.7 (prior CHEMDRAW incorporation) to 7.3 (post CHEMDRAW incorporation) is very impressive. The students' feedback following the initiative was positive and very supportive. Most students stated that with CHEMDRAW they experienced a challenging learning environment engaged with dynamic illustration & interactive visual and would like to see such software integrated in their chemistry studies from day one. Other parameters could be tested in the future, e.g., Students' attitude toward learning chemistry as well as in more depth students' conceptual understanding of chemicals.

Hence the present study, which sets out to investigate the problems students have with understanding the systematic naming of inorganic compounds, is an important one. The fact that little academic research appears to have been done in this area, also makes this study a valuable one.

**Statement of the Problem**

Chemistry is a branch of science which deals with the composition, properties, and uses of matter. It probes into the principles governing the changes that matter undergoes. According to the West African Examinations Council, the sole organizer of Senior Secondary School

Certificate Examinations for West African Countries, a chemistry curriculum should, amongst other objectives:

(i) Facilitate a transition in the use of scientific concepts and techniques in integrated science;

(ii) Provide the students with basic knowledge of chemical concepts and principles through an efficient selection of content sequencing;

(iii) Show Chemistry in its inter-relationship with other subjects;

(iv) Show Chemistry and its link with industry, everyday life, and benefits;

(v) Provide a course which is complete for pupils not proceeding to higher education while it is at the same time a post-secondary chemistry course.

Knowledge of chemistry through its content and processes has enabled us to produce good water for drinking, food, improved healthcare delivery through the production of drugs, production of various materials for construction in industries, roads, automobiles and in our homes. Chemical knowledge is also useful in solving problems resulting from human interaction with the environment like water, air, and land pollution. Despite the relevance of the knowledge of chemistry to the society, achievement of students in chemistry as measured by their scores in Senior Secondary School Certificate Examinations has been very poor up to the present day.

Apart from the heavy conceptual demand on the memory capacity required of the students' to study chemical content, one additional problem is that of naming chemical compounds, especially in organic chemistry. Chief Examiners' Reports have continuously indicated that candidates' poor performance in organic nomenclature has been their inability to write the correct names and structures of the organic compounds. The problem with chemical nomenclature has been reported with students elsewhere in the world.

**Objectives of the study**

The research objective was to investigate the impact of using physical types and virtual models on student understanding of new concepts and the spatial structure of molecules and to investigate the influence of gender on their performance in nomenclature achievement test (NAT).

**Purpose of the Study**

The main purpose of this study is to find out how to help the students remedy the problem identified in the nomenclature of organic compounds. Two major sources of the problems encountered by the students in learning nomenclature are from the chemistry textbooks and from the teachers. Some chemistry textbooks are not consistent with the names given to organic compounds. Some of these texts go with old names side-by-side with the IUPAC names. For instance, $CH_3CH_2OH$ or $C_2H_5OH$ stands for ethanol, ethan-l-ol and ethyl alcohol in some textbooks and they are the same. Why phenol $C_6H_5OH$ and not benzene alcohol? These and lot more pose doubt in the memory of the students as they learn organic nomenclature. Some chemistry teachers are not well grounded in naming organic compounds. They cannot give what they do not have. By implication, they cannot teach what they do not know.

So where do the students go from here? They are left in their own imagination. However, good teachers have employed the use of models, especially in teaching nomenclature in stereochemical compounds. These are compounds whose molecules have three-dimensional spatial configurations. Some stereochemistry models include ball-and-stick which are very useful in studying stereochemistry or the spatial arrangement of carbon atoms of relatively complex organic molecules. These are commonly used in teaching nomenclature in our schools. Because of the nature of the organic content of general secondary school chemistry which is not too wide and detailed as undergraduate chemistry, the use of the ball-and-stick model seems to suffix in demonstrating organic structures. This is why this model appealed to me for usage in this study.

**Research Hypotheses**

It was also hypothesized in the study that:

$HO_1$: There is no significant difference between the mean performance of students taught naming organic compounds using ball-and-stick and with those taught with the chart.

$HO_2$: There is no significant difference between the mean performance of students taught naming organic compounds using ball-and-stick and that of those taught with the chart with respect to gender. The hypotheses were accepted or rejected at an alpha level of significance of $P \leq 0.05$.

## Methodology

The research design adopted for this study is quasi-experimental design. Quasi-experimental design is considered appropriate for the study because intact classes were used to avoid disruption of normal class lessons, intact classes were used because some of the selected schools were privately owned schools, with thus, small population size. A total of 285 respondents from all the six (6) selected senior secondary schools with a total population of one thousand and ninety-six (1096) students in Sabon Gari Local Government Area constituted the study. The sample size was chosen in line with Sample Size Calculator with 5% confidence interval which is a public service of Creative Research Systems survey software. This was to ensure that all students were duly represented in the study. Simple random sampling was used in selecting the targeted number of respondents from all schools to represent the sample for the study. The main instrument for data collection in this study is a researcher designed assessment test titled Nomenclature Achievement Test (NAT). The test was administered to students from the various selected schools within a period of ten (10) weeks. Data analysis is the process of systematically applying statistical and/or logical techniques to describe, illustrate, condense, recap, and evaluate data. Therefore, in this research work, the researcher used the statistical package for Social Science (SPSS, version 22) as a statistical tool for data analysis.

## Results

### Performance of students in Naming Organic Compounds Using Ball-and-stick Model and a Chart

Descriptive statistics is showing the performance of students exposed to teaching with chart and ball-and-stick model**.**

**Table 1: descriptive statistics of students when exposed to both teaching methods**

| Variable | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|
| Chart | 285 | 5.06 | 1.179 | 0.070 |
| Ball-and-Stick | 285 | 8.43 | 1.340 | 0.079 |

In respect to the performance of students in naming and drawing up the structure of organic compounds, it was evident that majority of the students had difficulties in drawing the structure of the organic compounds especially when they were exposed to the concept using chart, majority of the students' in their performance had an average score of 5.06 out of 15, their performance, when taught the same concept using the ball-and-stick model, was more encouraging they had an average score of 8.43 out of 15 as indicated in the descriptive statistics above. This shows that the use of concrete materials which is a theoretically based

simulation of reality will affect the performance of students when it comes to organic chemistry concepts, thus this research recommends the use of concrete materials in teaching organic chemistry nomenclature in secondary schools.

**Test of Hypotheses**

In order to test the null hypothesis which states that "there is no significant difference between performance of students taught naming organic compounds using the ball-and-stick model and those taught with chart" for Senior Secondary School chemistry students in Sabon Gari Local Government area, the collected data was subjected to t-test using Statistical Package for social science version 22 (SPSS, 22), The result is presented in the table below.

**$HO_1$:** There is no significant difference between the mean performance of students taught naming organic compounds using ball-and-stick and those taught with the chart.

**Table 2: T-test Analysis of the Test Mean Scores (performance) of the Students Taught Chart and those using Ball-and-stick**

| Variable | N | X | S.D | S.E | Df | t- value | P | Remarks |
|---|---|---|---|---|---|---|---|---|
| **Chart** | 285 | 5.06 | 1.179 | 0.070 | 284 | 72.368 | 0.034 | Rejected |
| **Ball-and-stick** | 285 | 8.43 | 1.340 | 0.079 | 284 | 106.199 | | |

Significant @ P≤ 0.05

**$HO_2$:** there is no significant difference between the mean performance of students taught naming organic compounds using ball-and-stick and that of those taught with the chart with respect to gender.

**Table 3: T-test Analysis of the Test Mean Scores (performance) of the Students Taught using Ball-and-stick Model in respect to Gender**

| Variable | N | X | S.D | S.E | Df | t- value | P | Remarks |
|---|---|---|---|---|---|---|---|---|
| **Male** | 150 | 9.57 | 1.640 | 0.134 | 149 | 71.436 | 0.045 | Rejected |
| **Female** | 135 | 6.95 | 2.558 | 0.220 | 134 | 31.563 | | |

Significant @ P≤ 0.05

**Discussion of Results**

Descriptive statistics in table 1 showed the performance of students in naming and drawing up the structure of organic compounds, it is evident that majority of the students find difficulties in drawing the structure of the organic compounds especially when they were exposed to the

concept using chart since majority of the students' performance is an average score of 5.06 out of 15, their performance when taught the same concept using the ball-and-stick model is more encouraging since their performance is an average score of 8.43 out of 15 as indicated by the descriptive statistics above. This shows that use of concrete materials which is a theoretically based simulation of reality will affect the performance of students when it comes to organic chemistry concepts. Thus this research recommends the use of concrete materials in teaching organic chemistry nomenclature in secondary schools.

The data obtained in Table 2 above shows that there is a significant difference in the performance of students taught using Chart and the same set of students using Ball-and-stick. Since an alpha level significance of 0.034 was found, thus the Null hypothesis which states; there is no significant difference between the mean performance of students taught naming organic compounds using ball-and-stick and that those taught with the chart.is thereby rejected and the alternative hypothesis which states; there is a significant difference between the performance of students taught naming organic compounds using ball-and-stick and those taught with the chart is therefore retained. This finding seems to be pointing to the direction that teaching organic compound nomenclature is fruitful using stereochemistry model such as ball-and-stick. One good thing about ball-and-stick is that the atoms and functional groups are represented in colors and sizes compared with the sketches on the chart that appear to be mock forms of the compounds. Models are concrete and easily attract the attention of the learner to conceptualize the structure of the compound through the models. Students can be encouraged to acquire a model box on their own which will enable them to practice naming of organic compounds on their own.

The data obtained shows that there is a significant difference in the performance of male and female students taught Ball-and-stick. Since an alpha level of significance of 0.45 was found, thus the null hypothesis which states; there is no significant difference between the mean performance of students taught naming organic compounds using ball-and-stick in respect to gender is thereby rejected and the alternative hypothesis which states; there is significant difference between the mean performance of students taught naming organic compounds using ball-and-stick in respect to gender is therefore retained. It was revealed above that boys were significantly better than girls in naming organic compounds (see Table 3). Thus, the use of stereo-chemical models in teaching nomenclature of organic compound proved very useful

in learning the names and structure. These results are in accord with the findings of Barnea & Dori (2000).

**Summary of Findings**

i. There is a significant difference between the performance of students taught naming organic compounds using ball-and-stick and those taught with chart

**ii.** There is a significant difference between the mean performance of students taught naming organic compounds using ball-and-stick in respect to gender

**Conclusion**

In chemistry, physical ball-and-stick models derived from polystyrene spheres and plastic straws were not merely enlargements of the molecules that they are intended to represent. For example, the relative diameter of the spheres represents the size of the different atoms, or all the sticks (straws) are of equal length, while "real" molecular bond lengths were not. Space-filling models focus on different properties of the molecule. While the experimental students used various model types that they were able to construct, multiple representation modes for the same molecule mentally. The teacher used just one type of physical model, limiting students' experience with models and causing their model perceptions to be partially adequate.

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# Principals' Strategic Management and Students' Learning Outcome in Secondary Schools in Ondo State, Nigeria

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**Abstract**
The study examined the level of principals' and teachers' involvement in strategic management and determined the level of students' academic performance and constraints to strategic management in secondary schools in Ondo State, Nigeria. Four research questions and three hypotheses were formulated. Descriptive survey and ex-post facto research designs were adopted. 60 principals and 1200 teachers were sampled from 60 secondary schools using a multi-stage sampling technique. Participants completed instruments titled "Strategic Management Questionnaire" (SMQ) and "Students' Academic Performance Proforma" (SAPP). Data were analyzed using frequency count, percentage and Pearson Product Moment Correlation Coefficient at an alpha level of 0.05. Results showed significant relationship between principals' and teachers' involvement in strategic management (r-cal=0.912, p<=0.000), significant relationship between principals' strategic management and students' academic performance (r-cal=0.780, p<=0.000), and significant relationship between teachers' strategic management and students' academic performance (r-cal=0.593, p<=0.000). Major constraints included teachers' excess workload (58.3%), shortage of instructional materials (65%), lack of instructional technology (56.7%), inadequate capacity development (56.7%), lack of students' textbooks (56.6%), congested class size (56.7%) and lack of motivation (60%). It was concluded that the state government in collaboration with other relevant stakeholders in education sector should employ an adequate number of qualified teachers, provide adequate learning facilities and materials, and organize capacity building workshops to improve principals' and teachers' skills in strategic management for sustainable improvement in students' academic performance in secondary schools.

**Key Words:** Strategic Management, Strategy Formulation, Strategy Implementation, Strategy Evaluation, Learning Outcome

## 1. Introduction

The secondary education in Nigeria is made up of two components, namely, the Junior Secondary Education, and the Senior Secondary Education, with a duration of 3years respectively. The main goal of the Junior Secondary is to train students to acquire basic knowledge, national values, and skills for entrepreneurship and educational advancement. In the same vein, the Senior Secondary education aimed at the training of students for higher education, responsible citizenship, the world of work, wealth creation and entrepreneurship (Federal Republic of Nigeria, 2013). The classification of Nigeria's secondary education into two segments makes strategic management an important tool in the implementation of a diversified curriculum for the attainment of short-term, medium-term and long-term goals.

Strategic management is a process that requires collaborative and conscious efforts of top management members in formulating purposeful goals, rational allocation of resources, selecting the best strategies for policies and programmes implementation, job supervision, personnel motivation, performance evaluation, policy review and coping with internal and external challenges in order to achieve organizational objectives within the stipulated time-frame. It is therefore imperative that the school principals adopt strategic management approach in coordinating human and material resources by ensuring that teachers possess the competence (knowledge, skills, and experience) and use the best-fit methods in performing their tasks in order to achieve the set goals and sustain quality performance and efficiency.

The school principal is expected to initiate and articulate time-bound plans, explore opportunities, develop human capital into an effective workforce, create an enabling environment and monitor curriculum implementation and other related activities to achieve overall success. Management of teaching workforce and non-human resources involves goal-oriented strategies and activities that are geared towards quality education which equipped students with the needed knowledge and skills to become educated and fulfill the goal of secondary education by achieving desirable academic results for higher education.

A good knowledge of strategic management will enable both the principals and teachers to imbibe the culture of quality service delivery, make policy formulation and decision making process participatory, facilitating better planning of the school policies, activities and programmes, and ensuring that resources are adequately provided and appropriately utilized for holistic implementation of the school strategic plans to achieve the set educational goals and produce quality output/desired results in secondary schools.

This study is also considered worthwhile, and its outcome would provide additional information that could be useful and further strengthen the capacities of principals and policymakers on school strategic management for better quality service delivery and achievement of desirable students' learning outcome in secondary schools.

**2.1 Strategic Management Concept**

Strategic management is a holistic system that involves the collaborative effort of the top management in identifying organization goals, developing programmes/activities, and using best-fit methods to implement plans, measuring performance and making necessary changes towards achieving the organization vision and mission. This management system also links strategic planning and decision making on day-to-day business operation (Gluck, Kaufman, & Walleck, 1982).

According to Drucker (1986), the prime task of strategic management is the thinking through the overall mission of a business, which is, asking the question, "What is our business?" This leads to the setting of objectives, the development of strategies, and the making of today's decisions for tomorrow's results. Goodstein, Nolan, and Pfeiffer (1992) viewed strategic management as the process by which the top management members of an organization envision its future and develop the necessary procedures for tasks performed in order to achieve the set goals.

Strategic management is an essential tool used by the school principal and the board of governors to prepare the long-term strategic plan (Bell, 2002). This is concerned with the strategic implementation of the strategies that have been created and actually work in practice in effecting the changes that would need to take place within the scope of the organisation (Johnson & Scholes, 2002).

Strategic management involves deploying an organisation internal strengths and weaknesses, taking advantage of its external opportunities and minimizing its external threats/problems to achieve the set goals (Adeleke, Ogundele & Oyenuga, 2008; Nwachukwu, 2006). This underscores the need for school principals to be strategic in management in order to take the full benefit of the inter-relationship that exists between the internal and external environment of the school to achieve academic competitiveness in teachers' instructional tasks and students' performance (Albanese & Van Fleet, 2013).

In New Zealand, government policy on education provides autonomy for the school principals to serve as Chief Executive Officers and therefore given the statutory responsibility to embark on school self planning, reporting, self-review, and appraisal process to ensure effective implementation of strategic plans and accountability in all aspects of the school management rather than being curriculum leaders alone in schools (OECD, 2007). This practice enables the school principals to dedicate a significant amount of time and efforts to school operations, target-setting, monitoring, human and non-human resources management in the day-to-day activities of schools. These practices have a significant impact on school principals' competitiveness and students' learning outcome in schools (Nicolas, Reneta, Raffaella & John, 2014).

In African country like Kenya, government's policy placed a premium on the involvement of school principals in strategic planning as a means of improving the quality of education service delivery and achieving the better academic performance of students (Ministry of Education, 2005). In spite of this policy, students' academic performance in national examinations in public secondary schools in Kenya has been deteriorating and not achieving the desired results (Yara & Wanjohi, 2011). Consequently, the stakeholders have shown serious concern and doubts over the efficiency of the government's policy and the extent of implementation of strategic plans in public secondary schools (Bernard, Carlos &Sharon, 2014). This situation has been caused by low capacity development and slow implementation of strategic plans by school principals, and inadequate involvement of other relevant stakeholders in the external environment in the process of developing the school strategic plans (Okwako, 2013). It was, therefore, suggested that government should invest more resources and build the capacity of principals to facilitate proper strategic plans implementation practices in public secondary schools in Kenya (Owino & Oloko, 2015).

In Nigeria, there has been a limited government's commitment on capacity development of principals in strategic management in secondary schools. The common practice is that the government recognizes the role of the School-Based Management Committee (SBMC) in the formulation of school development plan and giving of relevant advice to school principals on matters bothering on students' academic progress and welfare. However, education policy

formulation, project execution, and programmes evaluation are still centralized in the Ministry of Education. This seems to incapacitate the SBMC in education policy initiatives and drive in secondary schools. The principal being the instructional leader still carries the responsibility for the overall success or failure of the school management. This made the issue of principals' involvement in strategic management very symbolic in order to achieve the set educational goals in secondary schools.

The level of academic success recorded in an educational institution depends largely on the quality and commitment of its human resources to the use of appropriate strategies in the formulation, implementation, evaluation and review of educational policies, plans and programmes (Bitanje, Kipohumba & Magutu, 2010). In the school setting, principals are expected to integrate the viewpoints of teachers and other stakeholders through committee system, departmental operations, Parent-Teachers' Association and School-Based Management Committee participation in the setting of school vision, mission and educational objectives; carrying out situation analysis in identifying and securing quality inputs which include manpower and learning resources (materials, equipment, /infrastructural facilities), structuring and deploying appropriate resources for strategic implementation activities which cover effective coordination, curriculum instruction, class management, instructional time management, students' assessment, records management, motivation, capacity development and adaptation to change in order to achieve desirable students' learning outcome.

The performance feedback are evaluated and reviewed by the principal in collaboration with other top management members, so as to make the necessary adjustment and refocus on quality inputs to ensure best practices in the strategic implementation of learning activities and achieve a quality output that will satisfy the expectation of stakeholders from the secondary school system. The cyclical operation of the strategic management model is illustrated diagrammatically below.

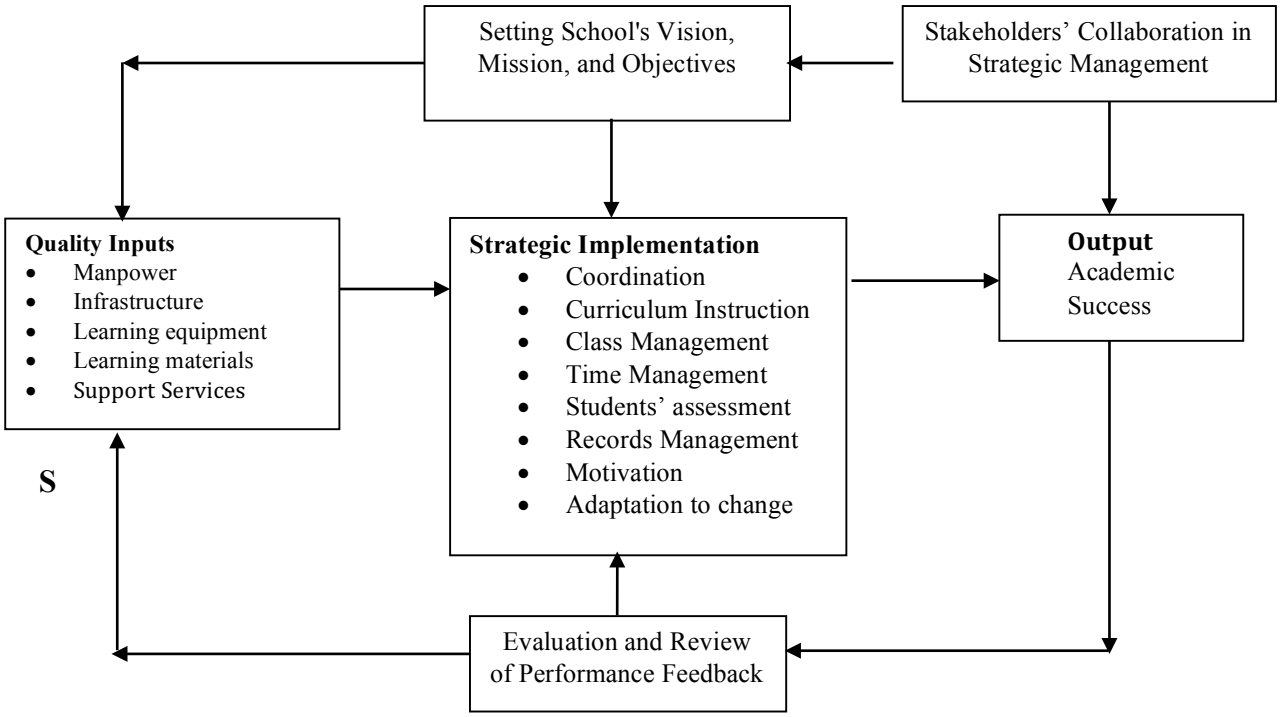


**Figure 1:** Strategic Management Model (SMM)

### 2.2 Strategic Management Process

Strategic management process consists of three stages which are categorized by Uvah (2005) as strategy formulation, strategy implementation, and strategy evaluation.

***Strategy Formulation***

The strategic formulation is the process of thinking ahead, and all educational managers should be involved with it. This enables the school principals to integrate the views of teachers in mapping out strategic plans and utilising available resources in managing internal and external challenges that are affecting education standard in secondary schools. It is through strategy formulation that the school principal can be pro-active in achieving the set goals (Adeleke, Ogundele & Oyenuga, 2008; Bryson, 1988 in Uvah, 2005).

The top management members have the best perspective to understand the ramifications of strategy-formulation decisions fully. In a secondary school setting, the principal has the authority to commit resources necessary for the implementation of educational policies, curriculum, and other related programmes. This includes developing a vision and mission, identifying an organization's external opportunities and threats, determining internal strengths and weaknesses, establishing long-term objectives, generating alternative strategies, allocate resources, and choosing appropriate strategies to pursue educational objectives.

Since no organization has unlimited resources, the principal in collaboration with other top management members (vice principals, heads of departments, subject heads, class coordinators, and coordinators of committees) and the school-based management committee

must decide which alternative strategies will benefit the school most in order to achieve quality output and sustain long-term competitive advantages in instructional management and students' academic performance. In Nigeria, the government has a strong commitment to education policy formulation but slack in the implementation. This has perhaps been responsible for the relatively low level of achievement of the set educational goals in terms of quality of instructional delivery and students' academic performance in secondary schools.

***Strategy Implementation***

This requires the expertise knowledge, skills and experience of the school principal to establish specific, measurable, achievable, realistic and time-bound (SMART) objectives, work scheduling, devise procedures, motivate employees, and allocate resources so that formulated policies and strategies can be effectively executed. The school principal is also expected to develop a strategy-supportive culture, create an effective organizational structure, communication procedure, budgets, and link employees' compensation to educational output in terms of students' academic performance. This is called the "action stage" of strategic management, which involves mobilising employees (teachers) and managers (subject heads, heads of departments) to put formulated strategies into concrete action through an effective teaching-learning process.

Strategy implementation activities affect all employees and managers in an organization. The teachers in every department must collaborate, brainstorm and decide on the modalities for implementing the school curriculum. Interpersonal skills are especially critical for successful strategy implementation. This raises questions, such as "What must we do to implement our part of the organization's strategy?" and "How best can we get the job done?". The challenge of implementation is to stimulate heads of departments and other teachers to build team spirit and work with absolute commitment, personal discipline, dedication, pride and enthusiasm toward achieving stated objectives.

In Nigeria, the level of the implementation of the national policy on education appears to be relatively low because of the quality gaps in learning facilities, instructional delivery, and management. These are partly attributed to the lack of government’s strong commitment to strategic management in education which resulted in inadequate functional infrastructure, inadequate learning materials, low capacity development and inadequate motivation which make teachers disillusioned in the delivery of curriculum. The study by Achor (2013) on Benue and Kogi States, Nigeria revealed that poor funding, large class size, lack of technology support and non-training of teachers ranked highest among the problems affecting the implementation of Basic Education.

Okebukola (2011) reported that most of the public secondary schools in Nigeria are sub-standard in terms of quality of infrastructure, fittings, landscape and general school environment when measured against international standards and when compared with the conditions in equivalent schools in Europe, North America, Asia, South Africa and Egypt. These disparities could be partly attributed to limited attention being given to strategic management in Nigerian secondary schools. Despite these challenges, there was a significant improvement in the performance of candidates who sat for the WASSCE and obtained credit

level passes in five subjects, including Mathematics and English Language as reflected in 30.99% recorded in 2011 and 52.97 percent in 2016 (Adenipekun, 2016). This might not be unconnected with the increased stakeholders' collaboration and support services at the secondary school level.

***Strategy Evaluation***

This is the final stage in strategic management. Principals and teachers need to know when particular strategies are not working well; strategy evaluation is the primary means for obtaining this information. All strategies are subject to review and future modification because external and internal factors are constantly changing. Three fundamental strategy-evaluation activities are (i) reviewing external and internal factors that are the bases for current strategies, (ii) measuring performance, and (iii) taking corrective actions. These will enable both principals and teachers to make the necessary adjustment in the teaching-learning process in order to achieve the best learning outcome in secondary schools.

Strategy evaluation is needed because success today is no guarantee of success tomorrow. Success always creates new and different challenges; complacent can make organization experience setback and loose relevance in the production of desired quality products. The level of dilapidation of infrastructure, inadequate learning resources and relatively low level of students' academic performance in Nigerian secondary schools are matters of concern to stakeholders. It is therefore expedient that the school principals should devise an appropriate mechanism for continuous integration of significant stakeholders, effective monitoring, supervision, periodic evaluation and review of instructional management strategies to engender innovation into teaching and learning activities for better academic performance in secondary schools.

## 3.1 Statement of the Problem

Personal observations and experience as a Lead Evaluator in Quality Assurance in Education in Ondo State up till 2013 and professional interactions with principals and teachers during undergraduates' teaching practice supervision between 2014 and 2017 indicated varying degrees of inadequacies in principals' managerial strategies. These gaps had been partly attributed to the limited capacities of principals in school operations in the aspects of target setting, instructional planning, resource utilization, instructional supervision, evaluation and review of instructional tasks management strategies and students' performance. This study is also embarked upon because there is limited research finding on secondary school principals' strategic management practices in Africa and particularly in Nigeria context.

Principals' strategic management is linked with the teachers' role in the translation of educational policies and curriculum. However, the issue of the low level of students' academic achievement is still prevalent in Nigerian public secondary schools. This has been of much concern to the stakeholders. The trends in students' academic performance in Nigeria reflected the following percentage points: 30.99% was recorded in the year 2011 and 38.81% in 2012, also 36.57% was recorded in 2013 and 31.28% in 2014 while 38.68% was recorded in 2015 and 52.97 percent in 2016. The levels of performances indicated that the percentage of

students who obtained credit level passes in five subjects and above, including English Language and Mathematics in the Senior School Certificate Examinations conducted by the West African Examinations Council, was below 53 percent (Owadiae, 2011; Owadiae, 2012; Eguridu,2014; Eguridu, 2015; Adenipekun, 2016). The relatively low level of academic achievement could be a reflection of poor or absence of strategic management, which emanated from lack of involvement of teachers in the decision-making process, unclear identification of school vision and mission, improper planning of school academic work to guide teaching and learning activities, lack of appropriate strategies for quality service delivery, poor evaluation techniques and lack of motivation of teachers.

The perceived short-comings/inadequacies constituted gaps in school management and possibly caused low productivity (low level of teachers' commitment to different educational activities and programmes) while educational objectives that are set by the school principals are not fully achieved. There is, therefore, the need to carry out a research on the efficacies of principals' and teachers' involvement in strategic management in determining the impact on students' academic performance in secondary schools in Ondo State, Nigeria.

### 3.2 Research Questions

The following research questions were raised to guide the study.

i. What is the level of principals' strategic management in secondary schools?
ii. What is the level of teachers' strategic instructional management in secondary schools?
iii. What is the level of students' academic performance in secondary schools?
iv. What constraints are faced in strategic management in secondary schools?

### 3.3 Hypotheses

The following research hypotheses were formulated to guide the study.

$Ho_1$: There is no significant relationship between principals' and teachers' strategic instructional management in secondary schools.

$Ho_2$: There is no significant relationship between principals' strategic management and students' academic performance in secondary schools.

$Ho_3$: There is no significant relationship between teachers' strategic instructional management and students' academic performance in secondary schools.

### 3.4 Research Method

The study examined the level of principals' and teachers' involvement in strategic management and determined the level of students' academic performance and constraints to strategic management in secondary schools in Ondo State, South West, Nigeria. Four research questions and three hypotheses were formulated. The study adopted the descriptive survey and *ex-post facto* research designs. The target population comprised all principals and teachers in public secondary schools in Ondo State, Nigeria. Multi-stage sampling technique was used to select six (6) Local Government Areas (LGAs) with two (2) LGAs randomly selected in each of the existing three (3) senatorial districts (Ondo North, Ondo Central, and Ondo South). Respondents consisted of 60 principals and 1200 teachers randomly sampled from 60 (20%) out of the existing 304 public secondary schools in Ondo State.

Data were collected using the "Strategic Management Questionnaire" (SMQ) and "Students' Academic Performance Proforma" (SAPP). The instrument utilized a four-point Likert rating scale classified as Strongly Agree (SA), Agree (A), Fairly Agree (FA) and Disagree (D) with a value of 4, 3, 2 and 1 respectively. The instrument consisted of a total of 30 structured questionnaire items. The questionnaire contained two sections (A and B). Section "A" of the instrument was divided into two sub-sections and contained 22 items constructed for teachers to rate principals' strategic management practices which cover variables such as school vision, mission and objectives, work plan, resource allocation and utilization, capacity development, learning facilities and materials, motivation, performance evaluation, feedback and review. The second part of section "A" elicited information from teachers on strategic instructional management which cover variables such as goal setting, timetable, scheme of work, curriculum delivery, capacity training, workloads, instructional materials, evaluation, feedback, and performance review. Section "B" of the instrument contained 8 items which elicited information from principals on constraints faced in instructional management. Also, the principals completed proformas on students' academic performance in the West African Senior School Certificate Examinations conducted by the West African Examinations Council (WAEC) between 2014 and 2016.

The researcher was assisted by two trained research assistants who helped in the administration of questionnaires. The researcher visited the sampled schools and solicited for the cooperation of the principals who gave permission to the researcher to contact teachers in their respective common departmental staff rooms and implored sampled respondents who completed the questionnaires. The completed questionnaires were collected from the respondents on the same day. The few respondents who could not fill the questionnaire on the spot were given opportunity till the next day when the researcher visited their schools to collect completed questionnaire. The administration of the instrument took ten (10) working days. This method enabled the researcher to achieve a 100% rate of return.

The research instrument was validated by experts in the Department of Educational Management, and Test and Measurement Unit, Faculty of Education, Adekunle Ajasin University, Akungba-Akoko. The reliability of the instrument was confirmed through test and re-test at an interval of two (2) weeks using two (2) secondary schools outside the Local Government Areas sampled for the study. The two set of data obtained were analyzed using Pearson Product Moment Correlation Coefficient (PPMCC); this yielded a reliability coefficient of 0.86, which confirmed the suitability of the questionnaire items constructed. Data were analyzed using frequency count and percentage to answer the research questions while the hypotheses were tested using Pearson Product Moment Correlation Coefficient (PPMCC) to determine the strength of the relationship between independent and dependent variables. The result was held significant at 0.05 levels, using Statistical Package for Social Sciences (SPSS) version 20.0.

## 4.0 Results

The results and discussions of data analyses are presented in two parts based on the research questions and hypotheses that were formulated for the study. Data collected on research questions were analysed using frequency count and percentage while hypotheses were tested

at 0.05 level of significance using Pearson Product Moment Correlation Coefficient (PPMCC). The results are presented in tables 1 – 7, and figures 2 – 4.

**4.1** *What is the level of principals' strategic management in secondary schools?*
The analysis of data in Table 1 and Figure 2 on principals' strategic management reflects the following percentage points: Strongly Agree (11.1% to 37.3%), Agreed (14.4% to 38.5%), Fairly Agree (17.8% to 38.4%) and Disagree (9.5% to 36.9%). These indicated that an average number of principals were effective in strategic management as revealed in formulating school vision and mission, resource allocation, coordinating human resources, performance evaluation, feedback, and review. These were reflected in percentage points of strongly agree and agreed responses combined, which ranged from 56.7 to 72.7% in items 1, 3, 7, 10, 11 and 12.

**Table 1**: *Principals' Strategic Management Practices in Secondary Schools*

| S/N | Items | SA Freq. % | A Freq. % | FA Freq. % | D Freq. % |
|---|---|---|---|---|---|
| 1. | Principals set the school vision and mission. | 411 (34.2) | 462 (38.5) | 213 (17.8) | 114 (9.5) |
| 2. | Principals operate flexible strategic plans. | 376 (31.4) | 245 (20.4) | 279 (23.3) | 299 (24.9) |
| 3. | Principals use strategic plan to allocate resources. | 448 (37.3) | 329 (27.4) | 222 (18.5) | 201 (16.8) |
| 4. | Principals deploy strategies to achieve objectives. | 189 (15.8) | 226 (18.8) | 342 (28.5) | 443 (36.9) |
| 5. | Principals monitor the utilization of resources. | 238 (19.8) | 385 (32.1) | 292 (24.3) | 285 (23.8) |
| 6. | Principals adhere strictly to the strategic plans. | 213 (17.8) | 331 (27.6) | 285 (23.8) | 371 (30.9) |
| 7. | Principals work with adequate human resources. | 335 (27.9) | 415 (34.6) | 223 (18.6) | 227 (18.9) |
| 8 | Principals work with adequate financial resources. | 133 (11.1) | 173 (14.4) | 461 (38.4) | 433 (36.1) |
| 9. | Principals and teachers set criteria for evaluation. | 264 (22.0) | 372 (31.0) | 267 (22.2) | 297 (24.8) |
| 10. | Principals evaluate teachers' performance. | 317 (26.4) | 373 (31.1) | 227 (18.9) | 283 (23.6) |
| 11. | Principals create a platform for teachers' feedback. | 327 (27.2) | 354 (29.5) | 232 (19.3) | 287 (23.9) |
| 12. | Principals create a platform to review students' Performance. | 433 (36.1) | 381 (31.8) | 267 (22.2) | 119 (9.9) |

**Source:** Field Survey

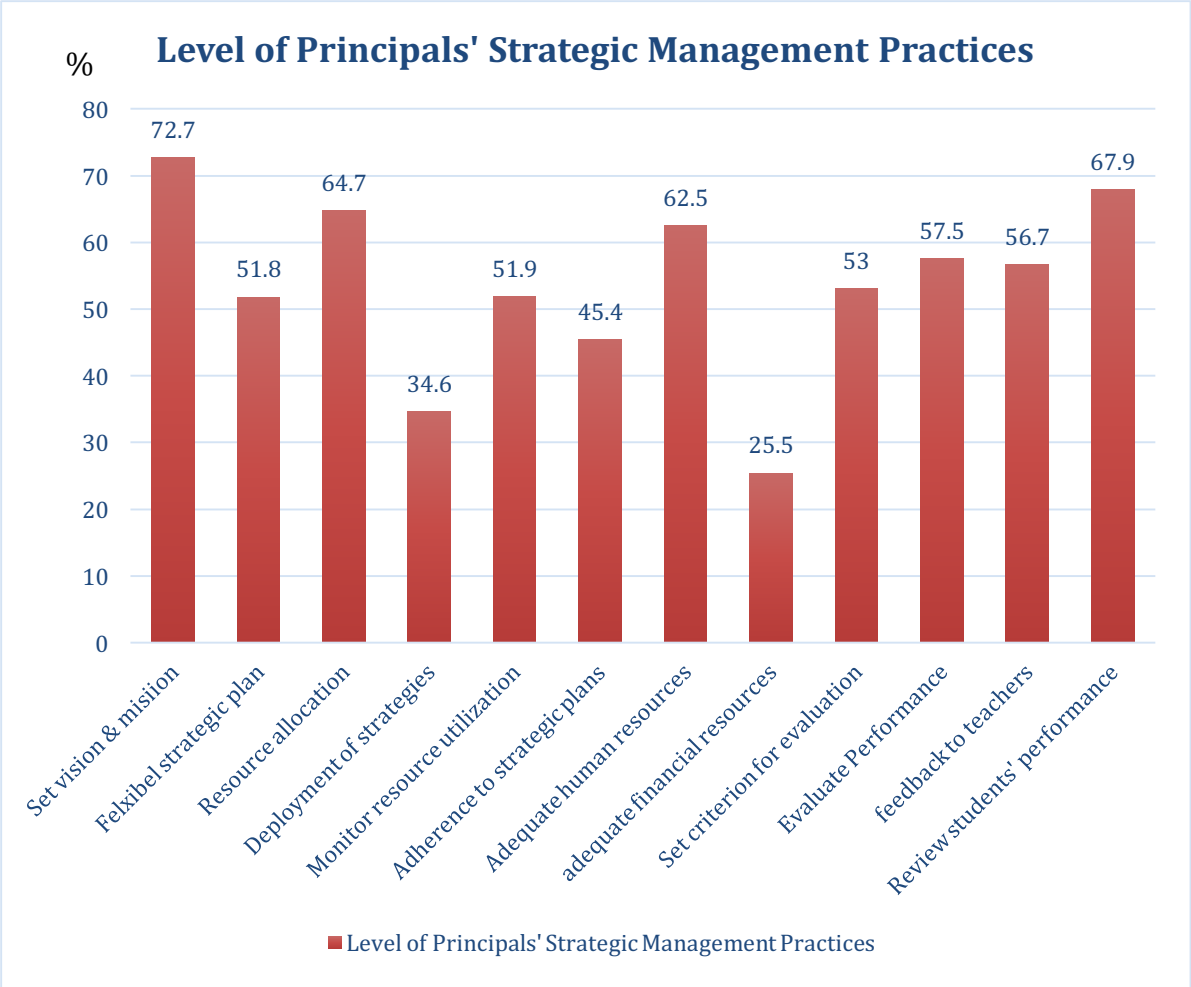


**Figure 2:** Bar Chart of Principals' Strategic Management Practices

**4.2** *What is the level of teachers' strategic instructional management in secondary schools?*

The evidence from the data analysis presented in Table 2 and Figure 3 showed that the level of teachers' strategic instructional management reflected the following percentage points: Strongly Agree (20% to 44.8%), Agreed (18.4% to 48.8%), Fairly Agree (11.8% to 38.5%) and Disagree (5.9% to 45.9%). These indicated that an average number of teachers were effective in strategic management as revealed in the preparation of work plan and timetable, the scheme of work, workload, performance evaluation, feedback, and review. These were reflected in percentage points of strongly agree and agreed responses combined, which ranged from 51.1 to 82.2% in items 2, 3, 6, 8, 9 and 10.

**Table 2**: *Teachers' strategic instructional management in secondary schools*

| S/N | Items | SA Freq. % | A Freq. % | FA Freq. % | D Freq. % |
|---|---|---|---|---|---|
| 1. | Teachers are involved in the setting of school goals and objectives. | 240 (20.0) | 336 (28.0) | 364 (30.3) | 260 (21.7) |
| 2. | Teachers are involved in the preparation of school work plan and timetable. | 293 (24.4) | 368 (30.7) | 462 (38.5) | 77 (6.4) |
| 3. | Teachers prepare a scheme of work. | 401 | 586 | 142 | 71 |

| | | | | | |
|---|---|---|---|---|---|
| | | (33.4) | (48.8) | (11.8) | (5.9) |
| 4. | Teachers used technology facilities for curriculum delivery. | - | 222 (18.5) | 427 (35.6) | 551 (45.9) |
| 5. | Teachers are given capacity training. | 271 (22.6) | 280 (23.3) | 283 (23.6) | 366 (30.5) |
| 6. | Teachers are adequately engaged with subject workloads. | 537 (44.8) | 391 (32.6) | 169 (14.1) | 103 (8.6) |
| 7. | Teachers engaged students in the use of instructional materials/textbooks. | 283 (23.6) | 221 (18.4) | 308 (25.7) | 388 (32.3) |
| 8. | Teachers' instructional tasks are evaluated. | 320 (26.7) | 293 (24.4) | 321 (26.8) | 266 (22.2) |
| 9. | Teachers give regular feedback to students. | 269 (22.4) | 381 (31.8) | 224 (18.7) | 326 (27.2) |
| 10. | Teachers have the platform to review students' academic performance. | 367 (30.6) | 356 (29.7) | 233 (19.4) | 244 (20.3) |

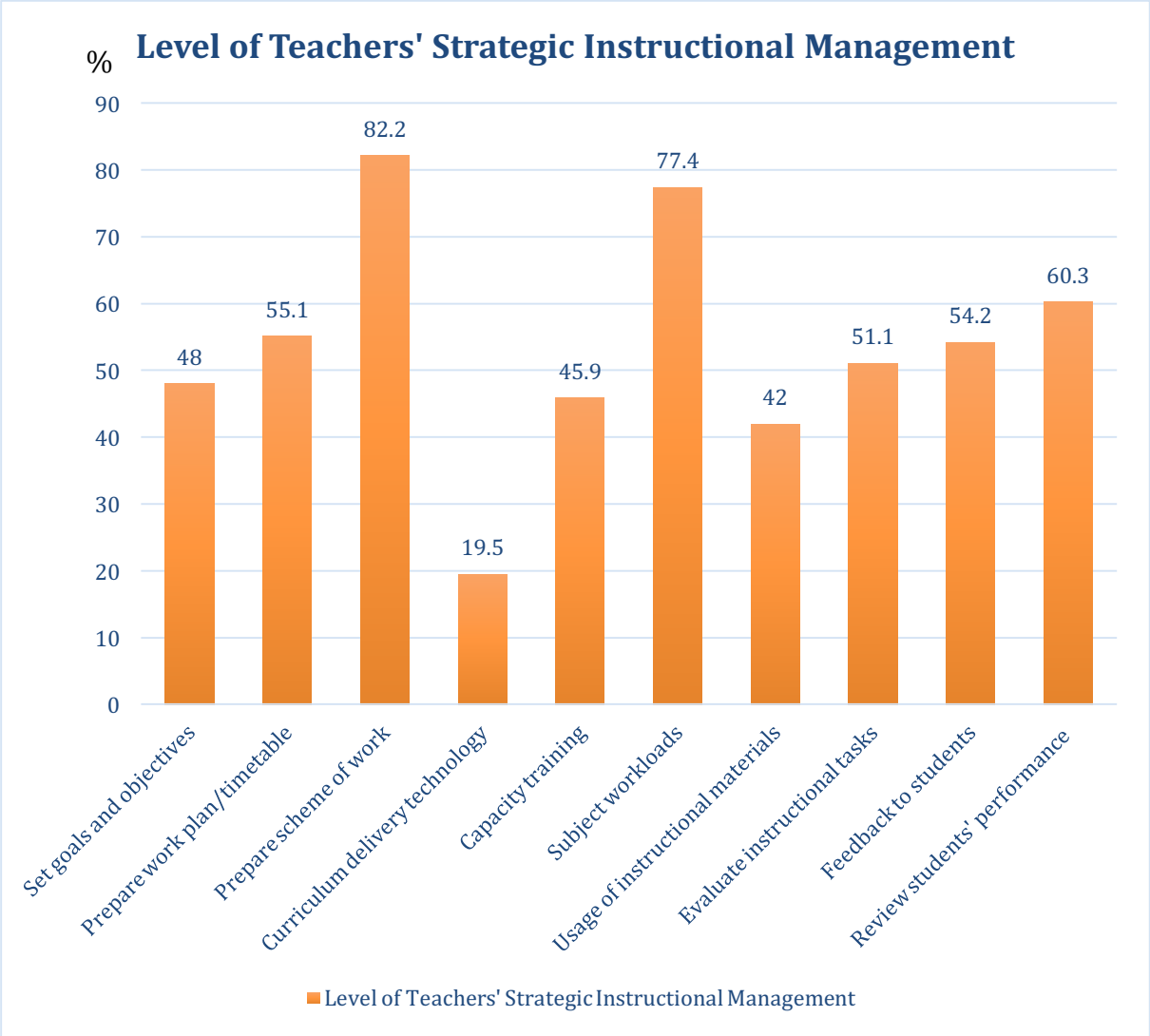


**Figure 3:** Bar Chart of Teachers' Strategic Instructional Management

**4.3** *What is the level of students' academic performance in secondary schools?*
Data presented in Tables 3, showed a weighted average of students' academic performance for three academic sessions (2014 – 2016). The result indicated that 21.59% of the candidates made five credits and above, while 29.30% made less than five credits and 49.11% made an ordinary pass. The percentage of students who failed was 18.2%.

**Table 3:** *Weighted average level of students' academic performance in WASSCE from 2014 - 2016*

| **Performance Grades** | Five (5) Credits including Eng. and Maths. | Five (5) Credits including either Eng. or Maths. | Five (5) Credits without English & Maths. | Less than Five (5) Credits | Candidates without any Credits (Ordinary passes) | Total |
|---|---|---|---|---|---|---|
| **No. of Candidates** | 488 | 989 | 2050 | 4788 | 8026 | 16341 |
| **Weighted Average (%)** | 2.99 | 6.05 | 12.55 | 29.30 | 49.11 | 100% |

**Source:** Field Survey

**4.4** *What are the constraints to strategic management in secondary schools?*
The analysis of data in Table 4 and Figure 4 on constraints faced in strategic management reflected the following percentage points: strongly agree (25.0 - 38.3%), agree (18.3 – 33.3%), fairly agree (18.3 - 31.7%) and disagree (16.7 – 23.3%). These indicated that strategic management is constrained with excess workload (58.3%), inadequate capacity development (56.7%), shortage of instructional materials (65%), lack of students' textbooks (56.6%), lack of instructional technology (56.7%), congested class size (56.7%) and lack of motivation (60%). These were reflected in percentage points of strongly agree and agreed responses combined, which ranged from 56.7 to 65% in items 1, 2, 3, 4, 5, 7 and 8.

**Table 4***: Constraints faced in strategic management in secondary schools*

| S/N | Items | SA Freq. % | A Freq. % | FA Freq. % | D Freq. % |
|---|---|---|---|---|---|
| 1 | Teachers have an excess workload | 17 (28.3) | 18 (30.0) | 12 (20.0) | 13 (21.7) |
| 2 | Lack of capacity development | 18 (30.0) | 16 (26.7) | 13 (21.7) | 13 (21.7) |
| 3 | Lack of instructional materials | 19 (31.7) | 20 (33.3) | 11 (18.3) | 10 (16.7) |
| 4 | Lack of students textbooks | 23 (38.3) | 11 (18.3) | 13 (21.7) | 13 (21.7) |
| 5 | Congested class size | 21 (35.0) | 13 (21.7) | 12 (20.0) | 14 (23.3) |

| | | | | | |
|---|---|---|---|---|---|
| 6 | Lack of good classroom infrastructure | 15 (25.0) | 13 (21.7) | 19 (31.7) | 13 (21.7) |
| 7 | Lack of motivation | 22 (36.7) | 14 (23.3) | 11 (18.3) | 13 (21.7) |
| 8 | Lack of instructional technology | 16 (26.7) | 18 (30.0) | 13 (21.7) | 13 (21.7) |

**Source:** Field Survey

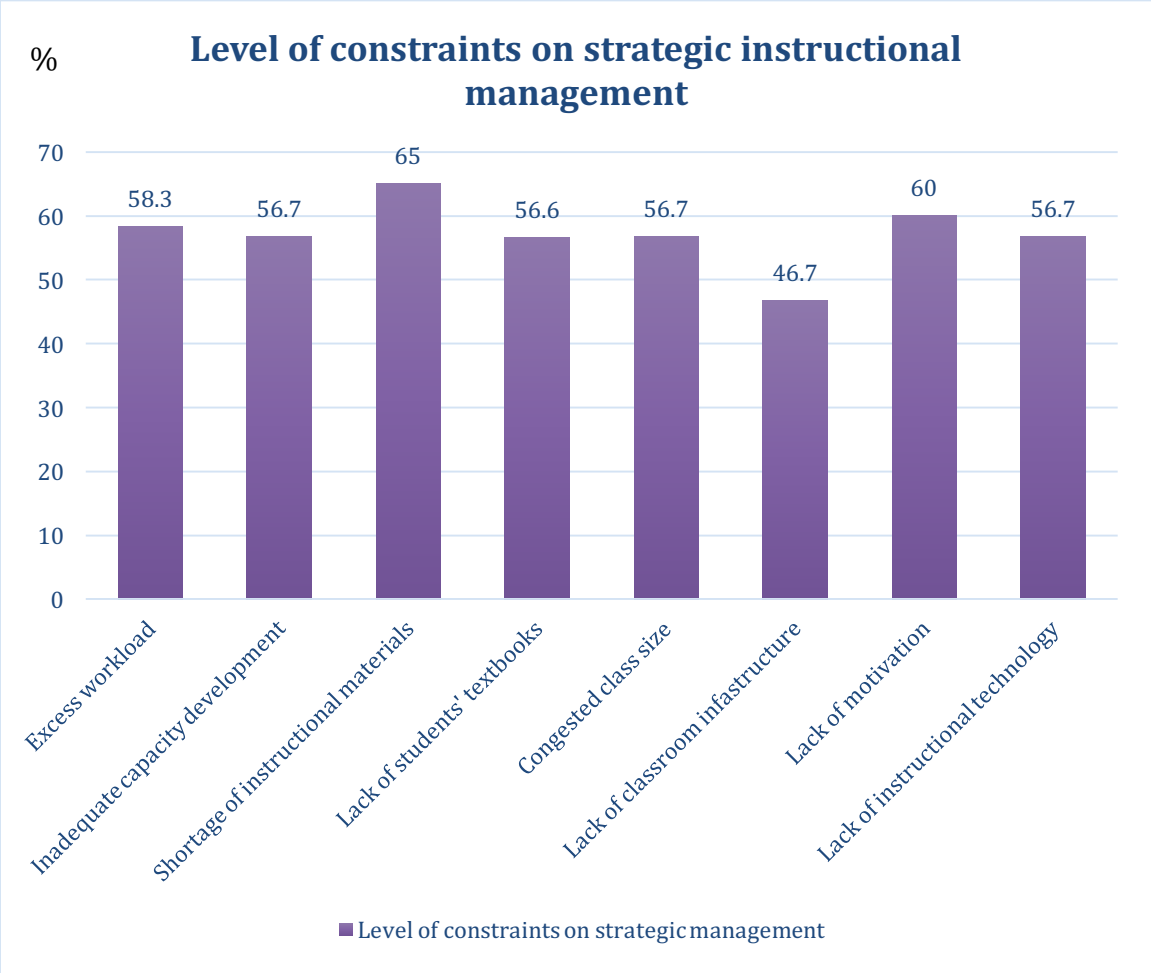


**Figure 4:** Bar Chart of Constraints on Strategic Instructional Management

**4.5** *Relationship between principals' strategic management and teachers' strategic instructional management in secondary schools*.

The result presented in table 5 revealed that the calculated r-value (0.912) was greater than the critical-value (0.000) at $p<0.05$ is significant. Hence, the null hypothesis (Ho) of no significant relationship is rejected. This implied that there is a significant relationship between principals' strategic management and teachers' strategic instructional management in secondary schools.

**Table 5**: *Relationship between principals' strategic management and teachers' strategic instructional management in secondary schools*

| Variable | N | Mean | Std | r | Sig |
|---|---|---|---|---|---|
| Principals' Strategic Management | 1200 | 2.9567 | 0.97669 | 0.912 | 0.000 |
| Teachers' Strategic Instructional Management | 1200 | 2.8442 | 0.93396 | | |

**4.6** *Relationship between principals' strategic management and students' academic performance in secondary schools*.

The weighted average of principals' strategic management and students' academic performance correlated on table 6 revealed that the calculated r-value (0.780) was greater than the critical-value (0.000) at $p<0.05$ is significant. Hence, the null hypothesis (Ho) of no significant relationship is rejected. This implied that there is a significant relationship between principals' strategic management and students' academic performance in secondary schools.

**Table 6**: *Relationship between principals' strategic management and students' academic performance in secondary schools*

| Variable | N | Mean | Std | r | Sig |
|---|---|---|---|---|---|
| Principals' Strategic Management | 60 | 2.9567 | .97669 | 0.780 | 0.000 |
| Students' Academic Performance | 60 | 5.1375 | 2.14375 | | |

**4.7** *Relationship between* teachers' strategic instructional management *and students' academic performance in secondary schools*.

The weighted average of teachers' strategic instructional management and students' academic performance correlated on table 7 revealed that the calculated r-value (0.593) was greater than the critical-value (0.000) at $p<0.05$ is significant. Hence, the null hypothesis (Ho) of no significant relationship is rejected. This implied that there is a significant relationship between teachers' strategic instructional management and students' academic performance in secondary schools.

**Table 7**: *Relationship between teachers' strategic instructional management and students' academic performance in secondary schools*

| Variable | N | Mean | Std | r | Sig |
|---|---|---|---|---|---|
| Teachers' Strategic Instructional Management | 60 | 2.8442 | 0.93396 | 0.593 | 0.000 |
| Students' Academic Performance | 60 | 5.1375 | 2.14375 | | |

**4.8 Discussions**

The extent to which the principals had been using strategic management was investigated in the study. The ratings of secondary school principals by teachers in table 1, indicated that an average number of principals were effective in strategic management in the components of school vision and mission, resource allocation, coordinating human resources, performance evaluation, feedback and review to improve teachers' instructional tasks performance.

The principals' strategic management approaches also reflected the following percentage points: inflexible strategic plans (48.2%), ineffective deployment of resources (65.4%), inadequate monitoring of resources (48.1%), non adherence to strategic plans (54.6%), and lack of financial resources to implement strategic plans (74.5%). It could, therefore, be inferred that 50% of the principals have fully adopted strategic management and committed to the implementation of strategic plans. The correlation between principals' strategic management and teachers' strategic instructional management has been due to the unwavering commitment by principals to achieve the set educational goals. Also, 50% of the principals lack the capacity to implement, monitor and drive sustainable strategic plans. This situation has perhaps been responsible for the relatively low level of success recorded in students' academic performance between 2014 and 2016 academic sessions as indicated in table 3.

The findings of the study in table 2, also indicated that an average number of teachers were effective in strategic instructional management as revealed in the preparation of work plan and timetable, the scheme of work, workload, performance evaluation, feedback, and review. However, the tasks that were fairly performed by teachers included: the corporate setting of school goals, usage of technology facilities and instructional materials, and capacity development. It could be deduced from the findings that teachers' involvement in strategic instructional management are still inadequate and could impair effective teaching and learning processes in secondary schools. The concordance relationship between teachers' instructional management and students' academic performance is an indication that both the teachers and students are affected by deficiencies in strategic management. Many of the students are not equipped with the necessary learning materials by their parents, while many of the secondary schools are ill-equipped for learning.

The analysis of data in table 4 revealed a significant relationship between principals' strategic management and students' academic performance. Principals are the driving force in secondary schools, and their strategies occupy centre stage in the teaching and learning processes. However, the mean score of 2.96 recorded on principals' strategic management

implied that majority of the principals are still striving to improve the teaching-learning process. It could also be deduced that the level of students' academic performance is a reflection of principals' commitment to strategic management. The in-depth interviews conducted with the principals corroborated the findings in table 2; the viewpoints revealed that infrastructural facilities are inadequate and the grants-in-aid to schools are very irregular. The class size is congested and ranged from 60-70 students per class in many schools. These deficiencies constituted hindrances to effective classroom management, teaching-learning process and supervision of curriculum instruction.

The challenges that are faced by the schools in strategic management are evident in table 4, which included excess workload (58.3%), inadequate capacity development (56.7%), shortage of instructional materials (65%), lack of students' textbooks (56.6%), lack of instructional technology (56.7%), congested class size (56.7%) and lack of motivation (60%). These deficiencies constituted impediments to principals' strategic management and teachers' instructional tasks management. The shortcomings will no doubt demoralise teachers and cause a setback in the implementation of the curriculum. The challenges would also make principals to be incapacitated in the supervision and monitoring of teachers' instructional tasks. These situations are likely to be responsible for the relatively low academic performance of students who obtained credit level passes in five subjects including English Language and Mathematics in the Senior School Certificate Examinations which has often been an average (50%) in Nigeria. There is, therefore, a great task ahead of school principals and other stakeholders in the education sector in giving desired attention to strategic management in order to improve students' academic performance in secondary schools.

### 5.1 Conclusion

In light of the findings, it could be concluded that an average number (50%) of the principals are very resourceful and pro-active in strategic management while 50% of principals have limited capacity in strategic management. Inadequate learning resources also constituted a major challenge that incapacitated teachers' instructional task performance and contributed largely to the relatively low level of students' academic performance. These phenomena account for the low level of achievement of the set educational goals. The principals being instructional leaders are expected to give adequate attention to teachers' active involvement in the strategic-management process in order to bridge the capacity gap in instructional management and ensure sustainable improvement in a teaching-learning process for the achievement of better academic standard and the attainment of the set goals in secondary schools.

### 5.2 Recommendations

Based on the findings and conclusion of the study, the following recommendations are made in order to achieve sustainable strategic management for the better academic performance of students in secondary schools.

- The school authority should provide constant and comprehensive feedback on students' academic performance to parents and encourage them to provide the required textbooks and other learning materials for their children/wards.

- The government in collaboration with other relevant stakeholders in education should demonstrate total commitment to the implementation of education policy by employing an adequate number of qualified teachers, provide adequate learning facilities and materials, and organize capacity building workshops to improve principals' and teachers' skills in strategic management to improve students' academic performance in secondary schools.
- The government should release the grants-in-aid to school principals as at when due to enabling educational managers (Principals) provide necessary materials for quality teaching-learning process and sustainable improvement in students' academic performances in secondary schools.
- The government should give adequate autonomy and capital grants to the school-based management committee to improve the condition of school infrastructure for quality education service delivery.

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# Teachers' Views and Attitudes on the Organization and Implementation of the Social and Emotional Intelligence Education Program

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**Abstract**
The present study examines teachers' views in the 30th Region of Primary Education of Attica, Greece in relation to the organization and implementation of the Social and Emotional Intelligence Education Program. The quantitative method was applied in the present investigation, and the questionnaire shared contained questions from three different pillars. Findings, deriving from teachers' and head teachers' views, show that there are differences between women and men as well as between head teachers and teachers, in terms of emotions expressed in teachers' work, desire to become ideal teachers, satisfaction by the profession, desire to remain in same profession and familiarity with this Program. Also, there are differences in terms of the recognition they feel they receive and of the feeling that the implementation of the Program improves their working environment. Overall, women understand better the emotions of others, use better communication strategies for students and parents, consider that the Program improves the school environment, develops students' and teachers' relationships, and the training for its implementation is crucial. Similar differences are also observed in the comparison between teachers and head teachers. The present study is one of the few of this kind that exists and reflects the teachers' views and attitudes who have implemented such Programs in a particular educational district.

**Key Words:** Emotional Intelligence, EQ, Self-Esteem, Emotional Strategy, Emotional Fulfillment, Social and Emotional Intelligence Education Program

## 1. Introduction

This paper attempts to examine teachers' emotional intelligence as well as their views on the implementation of the Social and Emotional Intelligence Education Program. Indeed, within the spur of change and new curricula, the teacher is called upon to play the role of facilitator, counselor, educator (Duskas, 2005). Teachers, to cope with their difficult work, they must be emotionally intelligent and empathic to recognize their emotions, manipulate them (Neophytou, 2013), and be able to manage students and parents properly. In the present study, teachers' emotional intelligence is examined through the emotional self-esteem, the emotional strategies and the emotional satisfaction they have in their profession, their views on the Social and Emotional Intelligence Program and the value of the training for its implementation.

*Purpose and Objectives of the Study*

The purpose of this proposal is to explore teachers' and head teachers' views of the 30th Primary Education Region of Attica, Greece that has implemented the Social and Emotional Intelligence Program, with respect to how they implemented it and the benefits to their students.

The aims of the present study are to show the importance of the Social and Emotional Intelligence Education Program in the educational process and, above all, to highlight the teachers' and the head teachers' role in the implementation of these programs.

The purpose leads to the following research questions:

1. What is the level of the emotional and social intelligence of the research teachers and does this affects their views-experience from the Program implemented in their school unit?
2. What are the teachers' views involved in the implementation of the Social and Emotional Intelligence Program, about its value and its usefulness in school in general?
3. How were teachers educated and trained to implement this Program?

## 2. Literature Review

### *2.1. The Concept of Emotional Intelligence*

Intelligence is a multidimensional feature that consists of a combination of skills that complement each other and help individuals to understand, manage and address issues that are presented to them.

Salovey, Mayer and Caruso gave the official definition of emotional intelligence by defining it as the ability of individuals to recognize their own first emotions and then to distinguish emotions and use them in a way that guides their thoughts and actions and to solve the problems presented to them (Mayer, Salovey & Caruso, 2000).

According to Bradberry & Greaves (2006), individuals have three complementary abilities that help them determine their thoughts and behavior:

- the Intelligence Index,
- Emotional Intelligence,
- the personality.

It should not be overlooked that individuals' emotional intelligence is not an inherent characteristic of the personality, but it indicates the level of individuals' emotional competence to interact with themselves and other people in their environment. What is emphasized is that emotional intelligence as a concept is different from personality (Law et al., 2004), but it is referred to as the individuals' competence to be able to personally handle the emotions of other people around them (Naqvi et al., 2016). However,

### *2.2. Social Intelligence*

In the early studies, psychologists argued that cognitive abilities are those that help the individuals solve the problems they are facing. Thorndike, however, in 1920, differentiated and used the term Social Intelligence as a concept introducing emotional intelligence, trying to define the individuals' ability to perceive themselves, recognize their motives and behavior, and interact with other people (Landy, 2005).

### *2.3. Multiple Intelligence*

Gardner, studying the concept of intelligence, analyzed it in eight genres, namely linguistic, mathematical, logical, visual, musical, kinesthetic, interpersonal and interpersonal. The two

forms of intelligence, however, that contribute to personal and professional success are Intrapersonal and Interpersonal Intelligence, which are the basis for the development of Emotional Intelligence (Gardner, 1983). More specifically, intrapersonal intelligence refers to the ability of individuals to recognize and understand their own moods, desires, motives, and intentions, and interpersonal intelligence is the ability of an individual to recognize and understand the moods and desires of other people.

*2.4. Emotional Intelligence according to Bar -On*

Bar-On, in the mid-1980s, defines emotional intelligence as a set of skills and abilities that help individuals successfully meet the challenges of their social environment (Platsidou, 2004) and considers it to be inextricably linked with social skills and skills of the individual.
He introduced E.Q. (Emotional Quotient) and developed the EQ-i (Emotional Quotient Inventory) as a tool for measuring social and emotional functions associated with psychological development (Bar-On & Parker, 2000), which is structured into five components.

*2.5. The mixed model*

Goleman emphasizes that emotional intelligence includes a range of social and communication skills and relates to how emotion management, self-knowledge, self-management, social awareness, and social skills are effective factors for the development of the person (Boyatzis, Goleman, & Rhee, 2000) and the formation of an effective behavior (Neophytou & Koutselini, 2006).

*2.6. Teachers' emotional intelligence*

Teaching is not only the ability of the educator to convey knowledge, but it is also an interactive and two-way relationship. That is why emotions play an essential role in teaching, enhancing the teachers' personal and professional identity. (Uitto, Jokikokko, & Estola, 2015).

Teaching, then, is an interaction, a communication of individuals (Uitto, Jokikokko, & Estola, 2015). Teachers, in order to teach, must firstly manage their students appropriately to facilitate their psychological development (Naqvi et al., 2016) to create relationships of security and trust (Buyse et al., 2008), reducing in this way the risk of aggressive behaviors (Dominguez et al., 2011). Also, they must have developed a proper communication with their students' parents, head teacher, and colleagues, and they should have a positive attitude towards life. Consequently, in order to become effective, they should consider how they teach beyond intellectual competence, professional skills and academic qualifications (Naqvi et al., 2016).

Based on the literature review, research on teachers' emotions was initially scarce and mainly centered on the field of cognition, behavior, skills, and performance (Uitto, Jokikokko, & Estola, 2015), thinking, research of "negative" emotions or disorders (Sutton, & Wheatley, 2003). The results of these surveys show that the way teachers manage their emotions creates a positive environment in the classroom, while their emotional weaknesses affect students and make their interactions more difficult (Denham, Bassett, & Zinsser, 2012) and this may lead to inappropriate approaches and impede student performance (Naqvi, et al., 2016). Teachers, who have a high degree of emotional intelligence, and use it as a skill, use it in the process of education (Yin, Lee & Zhang, 2013) to get better performance and to teach in more effective ways (Ghanizadeh & Moafian, 2010). This finding is also highlighted by Kremenitzer (2005),

who links the teacher's emotional intelligence with effective teaching. In addition, they work better with their colleagues, even those with lower emotional intelligence (Nizielski et al., 2012).

In the field of leadership, high emotional intelligence pushes head teachers to be more effective and to better support teachers (Brackett, et al., 2010). In addition, it encourages them to perceive personal emotions and to handle negative ones in a spirit of understanding, to approach others around them, to prove themselves as emotionally intelligent leaders who can guide and direct them (Prati et al., 2003). Another area of emotional intelligence contributes to communication. Survey results show that emotional intelligence develops one of the key features of teacher profile, their communication skills (Gursimek et al., 2008). That is why the teacher must be emotionally balanced.

Emotional intelligence, therefore, has a central place among teachers in schools, colleges and universities (Jennings & Greenberg, 2009). This is why many researchers emphasize that the selection criteria in education for both head teachers and teachers should include emotional competencies and interpersonal relationships in order to achieve better work performance (Iordanoglou, 2007; Brinia & Perakaki, 2018) and even more be a good predictor of performance (Corcoran et al., 2013).

*2.7. Students' Emotional Intelligence*

Modern education focuses on how to help children acquire both cognitive and emotional skills that will be useful to them in their lives. Goleman notes that one of the factors that help the adult to succeed in life is intrapersonal intelligence, which refers to abilities arising from high emotional intelligence, communication techniques, interpersonal relationships, time management (Low & Nelson, 2005) and knowledge obtained from school years with appropriate education (Elias, 2003).

More specifically, teachers, who act as mentors, control and coordinate the course, observe students' behavior, help and give directions to their students so that they can emotionally support them and lead them to recognize their emotions, improve their interpersonal relationships (Denham et al., 2010; Brinia & Psoni, 2018), the development of communication between them (Zins et al., 2004). They take initiatives when necessary, use a variety of strategies and methods, ensure that a safe classroom is created and improve learning through positive encouragement and feedback (Haskett, 2003) (López-González & Oriol, 2016). Besides, according to Dewey, communication, emotion, and learning are intertwined in the classroom (Titsworth et al., 2010), and by creating an appropriate pedagogical atmosphere (Duskas, 2005), students communicate and express themselves more easily, form relationships of trust and emotional interaction.

*2.8. Social and Emotional Intelligence Programs at School*

At school, problems are mainly those that affect the learning process, such as dyslexia. At the same time, however, there is an increase in the problems related to the psychological, emotional and social situation of children. Therefore, the implementation of programs for the Social and Emotional Intelligence of students is very widespread, because it helps their overall success (Zins et al., 2004).

Programs for Social and Emotional Intelligence are divided into three categories, including primary, secondary and tertiary prevention (Chatzihristou, 2004). More specifically, primary

prevention programs target large groups of the student population, they are distinguished in programs of Social and Emotional Intelligence and solving interpersonal problems (Chatzihristou, 2004) and can be implemented in the school environment by well-educated teachers. Zins (2007), notes that it is important within the school environment to enhance social-emotional development because school is a social part and learning is a social process. Secondary prevention programs are implemented by school psychologists and, finally, tertiary prevention programs are individual programs that are implemented for students with diagnosed disorders (Chatzichristou 2004).

Chryssi Chatzihristou, focusing on the role of the school for the positive development and mental well-being of the students, as head of the Center for Research and Applications of School Psychology by the University of Athens (CRASPUA), implemented the Program of Social and Emotional Intelligence Education in Primary Schools in Greece and Cyprus. This is an optional Primary Prevention Program for developing social and emotional skills.

## 3. Methodology

In order to investigate the issue, the quantitative method was considered to be the most appropriate, in order to produce data from which to draw general conclusions in a quick way (Kyriazis, 2009). In this study, a representative sample was used as a sample which yielded valid results and allowed the researcher to generalize the results (Korres, 2007). More generally, sampling, as a method of quantitative research, helps to draw out objective conclusions, since the researcher and the participants are at a certain distance and the result is difficult to affect (Creswell, 2011).

The 30th Athens Primary Education Region includes 14 schools in which 136 Primary Education teachers work. Of these, 20 implemented the Social and Emotional Intelligence Education Program (27,2%) and participated in the survey. Also, 10 of the 14 school principals who implemented the Program took part in the survey, and this was because at the end of the school year, because of head teachers' evaluations, some of them retired.

Initially, school units in the 30th Region received a written invitation from their own School Advisor to inform 5th and 6th grade teachers about the implementation of the Social and Emotional Intelligence Program by Chrissi Chatzihristou. Those who wished could take part in its specialized training and implementation in their classes during the Flexible Zone hours.

For the survey, a questionnaire consisting of 30 questions was used as a tool, using the 5-point Likert-scale as well as closed type questions, so that the time of completion by the participants was not inhibitory.

In the questionnaire, the first five questions relate to personal data. The following questions are divided into three pillars.
The first pillar: "Teachers' Emotional Intelligence and Professional Development" includes nineteen questions divided into three sections:

- Emotional self-esteem and teachers (questions 6-13)
- The emotional strategy at work (questions 14-20)
- The teacher's emotional satisfaction with the profession (questions 21-24)

The second pillar: "The Benefits of the Social and Emotional Intelligence Program for Students and Improving the School Environment" includes three questions (questions 25-27).

The third pillar: "Teachers' Training and Vocational Training for the Implementation of the Program" includes three questions (28-30), and the 5-point Likert scale is used.
The analysis of the data was done with the statistical program SPSS Statistics 24, a handy and widespread program used in quantitative sample survey methods (Creswell, 2011). The analysis included first, descriptive statistical measures and then comparisons with the $\chi^2$ test (comparison of percentages) and the t-test of independent samples (average comparison).

## 4. Findings

### 1st pillar

The first pillar of the questionnaire refers to teachers' emotional intelligence and professional development and is divided into three sub-sections:

*A. The first subsection addresses the teachers' emotional self-esteem.*

The t-test showed that teachers statistically significantly higher:
a. recognize their feelings (4,16 ± 0,59) with respect to the head teachers (3,76 ± 0,53), t (78) = 2,78, p = 0,00,
b. control their feelings (4.13 ± 0.47) with respect to the head teachers (3.81 ± 0.51), t (78) = 2.66, p = 0.00,
c. understand their emotions (4.27 ± 0.52) with respect to the head teachers (3.52 ± 0.51), t (78) = 5.68, p = 0.00.

*B. The second subsection addresses the emotional strategy at work.*

The t-test showed that men statistically significantly lower:
a. manage students and parents (4.04 ± 0.21) than women (4.23 ± 0.42), t (78) = -1.99, p = 0.05,
b. show false emotions to students and parents (1.74 ± 1.09) than women (2.54 ± 1.13), t (78) = -2.90, p = 0.00,
c. pretend they have emotions in the workplace (1,69 ± 1,97) compared to women (2,73 ± 1,02), t (78) = -4,16, p = 0,00,
d. work hard to show the emotions they must to students and parents (1.95 ± 1.15) than women (3.42 ± 0.73), t (78) = -6.83, p = 0.00,
e. show true emotions to students and parents (3.00 ± 0.60) compared to women (3.73 ± 1.09), t (78) = -3.04, p = 0.00,
f. show natural and spontaneous emotions to students (3,39 ± 0,84) compared to women (4,19 ± 0,76), t (78) = -4,12, p = 0,00,
g. show natural and spontaneous emotions to parents (2.40 ± 0, 84) compared to women (3.42 ± 0.99), t (78) = -4.29, p = 0.00.

The t-test also showed that the teachers statistically significantly higher:
a. manage teachers and parents properly (4.24 ± 0.43) with respect to the head teachers (4.00 ± 0.00), t (78) = 2.52, p = 0.01.
b. pretend to have emotion when in the workplace (2.76 ± 1.00) with respect to the head teachers (1.52 ± 0.87), t (78) = 5.00, p = 0.00,
c. work to show the emotions they must to students and parents (3.25 ± 0.84) with respect to the head teachers (2.28 ± 1.38), t (78) = 3.76, p = 0,00.

*C. The third subsection addresses the emotional satisfaction of the teacher with the profession.*

The t-test showed that women statistically significantly higher:
a. aspire to be ideal teachers (4.08 ± 0.74) with respect to men (2.65 ± 1.49), t (78) = -5.75, p = 0.00,
b. are satisfied with the profession (4.09 ± 0.66) with respect to men (3.43 ± 0.73), t (78) = -3.88, p = 0.00,
c. believe that being a teacher has a lot to offer them (4.58 ± 0.56) with respect to men (3.78 ± 0.73), t (78) = -5.22, p = 0, 00,
d) would again choose the same profession (4.19 ± 1.06) with respect to men (2.17 ± 1.40), t (78) = -7.00, p = 0.00.

The t-test also showed that the teachers statistically significantly higher:
a. aspire to be ideal teachers (3.98 ± 0.75) with respect to the head teachers (2.80 ± 1.72), t (78) = 4.24, p = 0.00,
b. declare satisfied with the profession (4.00 ± 0.67) with respect to the head teachers (3.61 ± 0.86), t (78) = -2.06, p = 0.04,
c. believe that this profession has a lot of important things to offer them (4.71 ± 1.13) with respect to the head teachers (2.47 ± 1.75), t (78) = 3.57, p = 0.00,
d. would again choose the same profession (4.19 ± 1.06) with respect to the head teachers (2.17 ± 1.40), t (78) = 4.59, p = 0.00.

**2nd Pillar**
The second pillar relates to the benefits of the Social and Emotional Intelligence Program to students and the improvement of the school environment.

The t-test showed the women, statistically significantly higher, to consider that this Program:
a. improves the working environment (4.47 ± 0.50) with respect to men (4.00 ± 0.00), t (78) = -4.50, p = 0.00,
b. improves student and teacher relationships (4.51 ± 0.50) with respect to men (4.09 ± 0.29), t (78) = -3.76, p = 0.00.

The t-test also showed the teachers, statistically significantly higher, to consider that this Program:
a. improves the working environment (4.41 ± 0.50) with respect to the head teachers (4.00 ± 0.00), t (78) = 2.23, p = 0.03,
b. improves the students' relations with teachers (4.53 ± 0.50) with respect to the head teachers (4.00 ± 0.00), t (78) = 4.76, p = 0.00.

**3rd pillar**
The third pillar relates to the teachers' training and vocational training for the implementation of the Program.

The t-test showed that women were, statistically significantly more familiar with the Program (3.18 ± 1.15) than men (1.95 ± 1.02). T (78) = -4.42, p = 0.00.

The t-test also showed (Table 43) that the teachers were statistically significantly more familiar with the Program (3.14 ± 1.10) than the head teachers (1.95 ± 1.20). T (78) = 4.11, p = 0.00.

## 5. Discussion of the Results

On the basis of the findings of the survey conducted, we will examine the questions raised. Initially, in the survey, two groups were included in the experimental group, which consisted of people who had implemented the Social and Emotional Intelligence Program in the classroom and the control group who had not implemented the specific Program. Of the participating teachers in both groups, men were less than women, and their ages ranged from 25 to 46+ years. Also, most teachers had a degree from Pedagogy Academy, had a degree of the same level or a postgraduate degree. Still, they were mostly teachers, and their teaching experience was for the experimental group from 16 to 30 years and for the control group from 21 to 30 years.

Subsequently, the research questions were divided into three pillars:

*Teachers' Emotional Intelligence*

The first research question referred to the teachers' level of emotional and social intelligence and was studied in the first pillar, which was divided into three sub-sections: emotional self-esteem, emotional strategy at work and emotional satisfaction from the profession. The teachers who participated in the research presented high scores in all three pillars of Emotional Intelligence that were examined, confirming the results of previous research (Platsidou, 2010, Chan, 2006) on the contribution of Emotional Intelligence to personality formation, motivation, professional development and in extension to the creation of a positive psychological environment within the classroom (Matsangouras & Makri-Botsari, 2003, Brinia & Psoni, 2016).

In more detail, the emotional self-esteem in the present study was quite high in both groups (M. = 30.96, S.D. = 1.71 for the experimental group and M. = 31.18, S.D. = 1 ,87 for the control group), with teachers having responded by "enough" to "very much" or "very much" and scored relatively high scores (929.00 in the experimental group and 1559.00 in the control team).
However, Cronbach's a-index was 0.34, indicating low reliability, contrary to the study by Hong-biao Yin, John Chi Kin Lee, Zhong-hua Zhang, Yu-le Jin (2013) which is 0,67-0,84 for the four subgroups in which the pillar questions are divided. This may be due to the fact that the sample of the present survey was small, while the sample in the research by Yin et al. (2013) is quite large (1281 teachers from elementary schools and high schools).

Then, by comparing the groups with each other in relation to emotional self-esteem, significant statistical differences were observed. The subjects in the experimental group had lower recognition of their emotions ($3.87 \pm 0.63$, $t(78) = -2.31$, $p = 0.02$). Statistical differences were also observed in gender comparisons with emotional self-esteem where women had a better understanding of their emotions ($4.22 \pm 0.50$, $t(78) = -3.81$, $p = 0.00$). However, as far as gender is concerned, the results of researches made, vary. Other studies, i.e. show that women have a better recognition of their emotions (Ciarrochi et.al., 2001, Nikolaou & Tsaousis, 2002), higher control of emotions (Petrides & Furnham, 2000) and are more sensitive to understanding others' emotions (Ciarrochi et al., 2000), while in other studies there are no significant differences (Dawda & Hart, 2000, Platsidou, 2010). Finally, statistical differences were also observed in the comparison of the position with respect to emotional self-esteem. Teachers appeared to better recognize their emotions ($4.16 \pm 0.59$, $t(78) = 2.78$, $p = 0.00$), better control ($4.13 \pm 0.47$, $t(78) = 2.66$, $p = 0.00$) and better understand the emotions of others around them ($4.27 \pm 0.52$ $t(78) = 5.68$, $p = 0.00$).

More generally, emotional self-esteem shapes self-awareness and helps develop interpersonal relationships.

The second sub-section examined was the emotional strategy at work. From the survey data, the emotional strategy at work was high for both groups (M. = 21.33, S.D. = 4.36 for the experimental and M. = 23.26; S.D. = 5.25 for the control group). The value of Cronbach's α was 0.84, which is highly credible, just like the research by Yin et al. (2013) where the Cronbach's α is 0.74, 0.79 and 0.85 respectively for the three subgroups separated by pillar questions. More specifically, the teachers, both of which score a high score (experimental group 640.00 and control group 1163.00), stated that they use appropriate strategies in their work. Indeed, as Brouzos (2004) says, teachers with the strategies they apply in each case try to penetrate the student's inner world in order to understand the emotions better, the experiences he experiences and his problems.

Then, in the comparison of the groups with the emotional strategy at work, statistical differences of the groups ($\chi^2$, p = 0.02 <0.05) were observed and even comparison with the t-test revealed that the subjects in the experimental group showed less false emotions to students and parents (1.96 ± 1.07, t (78) = - 2.08, p = 0.04) and were less likely to pretend to have emotions in their workplace (1.97 ± 1 , 00, t (78) = - 3.08, p = 0.00).
Also in the same sub-section, the teachers' communication with students and parents was pointed out. Teachers stated that they manage the students in an appropriate way. It is true that the teacher's communication with students influences the didactic act (Hargreaves, 2001) and at the same time, students perform better at the learning level and do not create problems in the classroom (Chatzidimou, 2000), when they love and like their teacher. In addition, in communicating with parents, the results showed that teachers properly manage the parents and show them genuine emotions. In the emotions they themselves had in the workplace, a high percentage replied that they were pretending to have emotions (36.70% in the experimental group and 48% in the control group), while a statistically significant difference in the groups was observed ($\chi^2$, p=0,02<0,05). It is a fact that emotional relationships play an important role in the workplace (Uitto, Jokikokko & Estola, 2015) and depend on the emotional and social abilities of the person who, along with the competition (Cherniss, 2000) is led to show another side of himself trying to improve and succeed both personally and professionally (Karatzia-Stavlioti, 2002).

In the comparison of the genders, women appeared to manage better students and parents (4.23 ± 0.42, t(78) = -1.99, p = 0.05), to show more false emotions to students and parents (2.54 ± 1.13, t(78) = -2.90, p = 0.00), to pretend more to have emotions (2,73±1,02 ,t(78)= -4,16, p =0,00), to show emotions they have to show (3,42±0,73 ,t(78)= -6,83, p =0,000), to have more genuine emotions towards students and parents (3,73±1,09 , t(78)= -3,04, p =0,00 ), natural and spontaneous emotions towards students (4.19 ± 0.76, t (78) = -4.12, p = 0.00), natural and spontaneous emotions towards parents (3,42±0,99, t(78)= -4,29, p =0,00). The fact that women manage better than men, the emotions of others is referred to in Platsidou's research (2010). Also, the fact that women show more genuine, natural and spontaneous emotions towards the students is due to the fact that they have maternal emotions towards them (Reay, 2001). Regarding the comparison of the position, the teachers responded that they better manage students and parents (4.24 ± 0.43), t (78) = 2.52, p = 0.01, fake emotions in the workplace (2.76 ± 1) , 00, t (78) = 5.00, p = 0.000), but they also try hard to show the appropriate emotions each time (3.25 ± 0.84, t (78) = 3.76, p = 0 , 00).

In conclusion, the teacher, with his emotional strategies, shapes the classroom learning environment and the way of communicating with his colleagues, students, and parents.
In the third sub-section, the teachers' satisfaction by their profession was high for both groups (M. = 14.96, S.D. = 3.79 in the experimental group and M. = 15.88, S.D. = 3.70 in the control group). Cronbach's α index was 0.88, showing high reliability with the same value being noted in Yin et al. (2013), which is 0.88. Thus, respondents, with a high score (experimental 449.00 and control group 794.00), said from "enough" to "very much" that they want to become ideal teachers, are satisfied with the profession that offers them important things, while from "no" to "very much," they said they would choose the same profession again. However, there were significant differences in the percentages of the groups, namely that they want to become ideal teachers ($\chi^2$, p = 0.01 <0.05), are satisfied with the profession ($\chi^2$, p = 0.04 <0.05) and would again choose the same profession ($\chi^2$, p = 0.00 <0.05).

In general, the teachers' satisfaction from the profession appears in other surveys (Koustelios et al., 2006; Dinham & Scott, 2000; Reilly, Dhingra, Boduszek, 2013; Zembylas & Papanastasiou, 2006) and is very important for their professional development and performance.

In this sub-section, however, there were significant statistical differences between the genders. Women stated that they are more likely to become ideal teachers (4.08 ± 0.74, t (78) = -5.75, p = 0.00), are satisfied with the profession (4.09 ± 0.66, t (78) = -3.88, p = 0.00), which gives them important things (4.58 ± 0.56, t (78) = -5.22, p = 0.00) and if they changed careers it would again be the same (4.19 ± 1.06, t (78) = -7.00, p = 0.00). These differences between the genders may be due to the fact that the profession of a teacher is considered to be mainly female because it provides free time to the women which assists them in their duties as mothers (Papastylianou, Kaila, Polychronopoulos, 2009). Of course, the reasons why it is mostly chosen by women are not mentioned in this research, a parameter that could be considered in future research. Statistically significant differences were also observed in comparison with the place where teachers stated that they wanted to become ideal teachers (3.98 ± 0.75, t (78) = 4.24, p = 0.00), are satisfied with the profession (4.00 ± 0.67, t (78) = -2.06, p = 0.042) which gives them important things (4.01 ± 1.13, t (78) = 3.57, p = 0 , 00) and would again choose the same (4.19 ± 1.06, t (78) = 4.59, p = 0.00).

*Teachers' views on the value and usefulness of the Social and Emotional Intelligence Education Program at school.*

The second research question was analyzed in the second pillar. The results of the study revealed the benefits of the Program in the school (M.= 12.63, S.D. = 0.76 in the experimental group and control group M. = 13.18, S.D. = 1.08). More specifically, the answers show that the Program improves the working environment ("very" 80% + 20%, "very much" 58% + 42%), creates a positive attitude towards the school ("very" 83.3 %+70%, "Very much" 16.7% + 30%) and improves the students' relationship with teachers ("very" 73.3% + 54%, "very much" 26.7% + 46%). Accordingly, the Hallam (2009) survey shows that the Program improves the working environment (52% "very", 7% "very much"), creates a positive attitude towards school (53% "very" and 23% "very much ") and improves the students' relationship with teachers (58%" very "and 7%" very much "). It is true that the implementation of the specific Program helps the school environment in general.

Then, in the comparison of the groups, the people in the experimental group considered that the specific Program did not greatly improve the working environment (4,20 ± 0,40, t (78) = -2,04, p = 0,04). In contrast, in the gender comparison in the Program, female teachers

responded that its application improves not only the working environment (4.47 ± 0.50, t (78) = -4.50, p = 0.00) but and student-teacher relationships (4.51 ± 0.50, t (78) = -3.76, p = 0.00). The same was found in the comparison of the position in the program. That is why, the teachers responded that the Program helps to improve the working environment (4.41 ± 0.50, t (78) = 2.23, p = 0.03) and the development of relations between students and teachers (4, 53 ± 0.50, t (78) = 4.76, p = 0.00).

*Teachers' Training and Vocational Training for the implementation of the Program*

The third research question was analyzed in the third pillar of the survey. The results highlighted, with a high score (experimental 291.00 and control group 465.00), how useful the teachers' training and vocational training are for the implementation of the Program (M. = 9.70, S.D. = 1.70 in the test group and M. = 9.30, S.D. = 1.77 in the control group). In more detail, the survey showed that teachers were trained in the Program ("quite" 33.3% + 54% to "very much" 6.7% + 24%), , ("little" 0.0% + 42% "quite" 73.3% + 18% and "very" 0.0% + 34%) and consider the training substantial (3.3% , 7% + 50%, "very" 53.3% + 48% and "very much" 26.7%). In the survey conducted during the American School of Education (Weissberg, 2015) the participants stated they are familiar with the Program ("Not at all" 33%, "fairly" 29% and "much" 14%), have been trained in the Program "do not need more education" 15%," need more education "68% and consider training substantial (" enough "40% and "very "23%). Besides, the approach of the Program requires the training of those who will take part (C.A.S.E.L, 2003), after being implemented in the class by the teachers, having received the appropriate training (Chatzihristou, 2005). Also, a statistical difference in group rates ($\chi^2$, p = 0.03 <0.05) was observed on this pillar in terms of acquaintance with the Program. Moreover, the comparison of the groups showed that the subjects of the experimental group were not very familiar with the Program (2,47 ± 0,90, t (78) = -2,041, p = 0,04), and stated to a higher degree that the training was substantial (4.03 ± 0.76, t (78) = 3.91, p = 0.00). In addition, female teachers were more familiar with the Program (3.18 ± 1.15, t (78) = -4.42, p = 0.00), as well as male teachers (3.14 ± 1.10, t (78) = 4.11, p = 0.00). The above-mentioned results seem to corroborate the importance of lifelong learning and vocational training (Brinia & Chatzichalampous, 2018).

## 6. Limitations of the present study and suggestions for future research

Difficulties were encountered in finding the head teachers of these schools, as many had retired due to the fact that new ones were appointed. The problem, in part, was solved (10 of the 14 head teachers took part in the survey) through many telephone communications. Also, the questionnaire included three different pillars, and, as a result, a two-stage pilot test was carried out to check its validity and reliability. Fortunately, the Easter holidays helped to ensure sufficient space between the two measurements.

Finally, the questionnaires were distributed to schools in breaks to avoid disturbing the smooth operation of the school by the researcher. That is why there was respect for both the school and the people. Even before the questionnaires were given, there was assurance that the information would be secret (Creswell, 2011) and no participant's answers would be shared.

According to the data analyzed, it is considered important to carry out the survey in a larger sample for better generalization of the results.

In addition, it would be better to look more closely at how teachers communicate with parents. As we have seen, educators expressing genuine emotions, try to manage the parents in an appropriate way, but the communication between them depends on many factors, with some of them referring to the ways they are used (Graham-Clay, 2005), the obstacles and perceptions that exist (Georgiou, 2000). It is therefore proposed to explore further the factors that make their communication difficult.

Also, teachers have stated, at fairly high rates, how satisfied they are with their profession. However, the satisfaction of the teacher's profession depends on other situations that are not mentioned in the survey. More focused research could, in the future, analyze the issues that satisfy or hinder the profession of the teacher. At high rates, women also stated that they choose the profession of the teacher more than men. It would be good future research to focus on the reasons why women prefer this profession.

## 7. Conclusions

This study is an attempt to investigate the teachers' emotional intelligence who have implemented the Program of Social and Emotional Intelligence in the 30th Region of Attica. It is one of the few studies of this kind that exist and reflects the teachers' views and attitudes who have implemented such programs in a particular educational district. The study shows that the teachers who participated in the research presented high scores in all three pillars of Emotional Intelligence, consider the Program beneficiary for school and deem their training and vocational training useful for the implementation of the Program.

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**Appendix**

**Questionaire for the Implementation of the Social and Emotional Intelligence Program**

**A. DEMOGRAPHICS**

**1. Gender**

☐ Male

☐ Female

**2. Age**

☐ 22-35

☐ 36-45

☐ 46+

**3. Education**

☐ Degree in Primary Education

☐ Degree at Pedagogical Academy

☐ Postgraduate Education

☐ Master's Degree

**B. SERVICE INFORMATION**

**4. Position in School**

☐ Head Teacher

☐ Teacher

**5. Education**

☐ Less than 3 years

☐ 3-5 years

☐ 6-10

☐ 11-15

☐ 16-20

☐ 21-25

☐ 26-30

## C. PILLARS

**1st Pillar**: *Emotional Intelligence and Vocational Training of Educators*

| | | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 6 | I know what and how I am feeling at any given moment | | | | | |
| 7 | I can manage my emotions | | | | | |
| 8 | I am good observer of others | | | | | |
| 9 | I understand other people's emotions around me | | | | | |
| 10 | I set goals and try to achieve them | | | | | |
| 11 | I encourage myself to do my best | | | | | |
| 12 | I am characterized by composure and manage difficulties reasonably | | | | | |
| 13 | I am able, when angry, to calm down quickly using reason | | | | | |
| 14 | I properly manage students and parents | | | | | |
| 15 | I display fake emotions to students and parents | | | | | |
| 16 | I pretend to have emotions when in workplace | | | | | |
| 17 | I work hard to display the emotions I must to students and parents | | | | | |
| 18 | I show to students and parents are genuine | | | | | |
| 19 | The emotions I show to students and parents are natural and spontaneous | | | | | |
| 20 | The emotions I show to parents are natural and genuine | | | | | |
| 21 | I want to be the ideal teacher by any means necessary | | | | | |
| 22 | I am satisfied with being a teacher | | | | | |
| 23 | Being a teacher has offered me important things | | | | | |
| 24 | If I had to choose a career again, I wouldn't change anything | | | | | |

**2nd Pillar**: *The benefits of the Social and Emotional Intelligence Program to students and the improvement of the school environment*

| | | I do not know | Totally Disagree | Disagree | Agree | Totally Agree |
|---|---|---|---|---|---|---|
| 25 | It creates a positive attitude towards the school | | | | | |
| 26 | It improves the working environment | | | | | |
| 27 | It improves the relationship between students and teachers | | | | | |

**3rd Pillar**: *Teachers' Training and Vocational Training for the implementation of the Program*

28. On a scale from 1-5 (5 being very familiar and 1 not being familiar at all) how familiar are you with Social and Emotional Intelligence?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| | | | | |

29. On a scale from 1-5 (5 being you have received an excellent education and 1 being no education at all) are you trained to teach social and emotional skills to students?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| | | | | |

30 To what extend do you agree or disagree with the following statement?

"The training I received, was important because it substantially helped to implement the Social and Emotional Intelligence Program to my students"

| Totally Disagree | Disagree a little | Agree a little | Strongly agree | Completely agree |
|---|---|---|---|---|
| | | | | |

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# E-Books to Enhance College Learners' English Self-Efficacy

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**Abstract**
The present study is to explore the effect of E-book reading activities for general purposes on EFL learners' English self-efficacy and language learning perceptions. Self-efficacy, claimed by a large number of researchers, has a direct and powerful influence on learners' academic accomplishments; English picture book reading, moreover, is suggested to be beneficial to language learners. However, there is little research on enhancing the level of English self-efficacy through reading English picture books, particularly in digital forms. The participants, in the study, 101 non-English-majored college students in Taiwan, were required to read E-books and upload their after-reading feedbacks to the Google Drive for the purpose of sharing them with other peers. The findings of the study reveal that the participants' general perceived English abilities and confidence were enhanced after their efforts on E-book reading activities. Furthermore, from the pieces of after-study learners' perceptions, they presented positive attitudes towards English learning.

**Key Words:** English Self-Efficacy, E-Books, Social Cognitive Theory, Sociocultural Theory

## Introduction

For many decades, memorization and rote-learning have almost occupied the ideas of language learning in Taiwan learners' minds (Wei, 2004). From the learners' perspectives, teachers are traditionally deemed as authority figures, dominating the whole classroom instruction, especially in Chinese society. The top-down method of instruction has been widely accepted in Taiwan (Lau, 2006); however, this approach is more likely to make learners more passive. Taiwan teachers' instructional focus, to be noted, should not be on producing perfect test takers but on creating an environment in which language learners are offered chances to practice the target language for different purposes or needs. To encourage students to read authentic materials and use the target language for communication should be the priority in Taiwan's English education.

Children's literature could create opportunities for language learners to become good readers and writers of a new language (Hadaway, Vardell, and Young, 2002). It also brings the learners to the world in which the text is more authentic and meaningful (Rigg and Allen, 1989). Children's literature should not only be applied to children but adult learners. The

story of children's literature could also motivate adult learners to learn a new language and lead them to an unknown but intriguing world of literature (Carger, 1993). English picture books, mostly suggested and often applied by language teachers, are of great help for language development and communication abilities (Freeman and Lehman, 2001; Huck, Helper, and Hickman, 1987; Louie and Sierschynski, 2015). The texts of English picture books are not as intimidating as English learning course books. The word numbers of English picture books are fewer than course books. The word difficulty of English picture books is, for most of the time, lower. Therefore, while reading English picture books, language learners' affective filter would be lower. Lower levels of affective filter would be better for language learning (Krashen, 1985).

Environments, based on the perspectives of Social Cognitive Theory and Sociocultural Theory, play a significant role in learning. Besides environments, learners' personal factors and behaviors also interact with each other. Humans, rooted within Bandura's conceptions (1995), are equipped with the distinctive abilities to "symbolize, plan alternative strategies (forethought), learn through vicarious experience, self-regulate, and self-reflect" (Pajares, 2008, p.112). With these abilities, humans would be able to determine their own fortune in which they are actively engaged and moreover, by their own actions, they can make things happen. Self-efficacy beliefs, as defined by Bandura (1995, p.2), are "the beliefs in one's capabilities to organize and execute the courses of action required to manage prospective situations." In other words, once people have the confidence in themselves to produce the desired outcomes, they will have the motive and incentive to perform the action and to continue doing so even in the face of difficulties or adversity. While facing difficult tasks, people with a higher level of self-efficacy take them as challenges, and they would do their best to cope with them (Bandura, 1989, 1997; Bandura & Adams, 1977; Cervone & Wood, 1995). As a result, self-efficacy has a direct and powerful influence on whether or not individuals accomplish their goals (Pajares, 2008). The accomplishments could be in academic contexts where students complete a school task and believe that their efforts succeed.

Successful learners with a higher level of self-efficacy would be more able to regulate their behaviors and to accomplish different tasks, even challenging ones (Fong & Yuen, 2016; Lent, Brown, & Larkin, 1984; Schunk, 1991, 2008; Zimmerman, 1989, 1990; Zimmerman & Martinez-Pons, 1990). Many studies across different academic domains suggest that there is a positive correlation between self-efficacy and academic achievement (Bandura, Bararanelli, Caprara, & Pastorelli, 1996; Bandura & Schunk, 1981; Collins, 1982; Elliot et al., 2000; Greene, Miller, Crowson, Duke, & Akey, 2004; Lent, Brown, & Larkin, 1984; Motlagh, Amrai, Yazdani, Abderahim, & Souri, 2011; Pajares, 1996; Schunk, 1995; Shell & Murphy, 1989; Zimmerman & Bandura, 1994; Zimmerman, Bandura, & Martinez-Pons, 1992). In addition to the effect of self-efficacy on performance, classroom environments also have a great influence on learners' self-efficacy and their actual performance. A learner-centered environment could play a significant role in enhancing learners' self-efficacy and their academic development. Meece et al. (2003) claimed that secondary school students demonstrated more positive self-efficacy in the context where learner-centered instruction, which resulted in a supportive learning atmosphere and enhanced higher-order thinking, was

highly emphasized. Technology-assisted language classrooms, to be noted, are claimed to create a learner-centered, supportive, and interactive context in which learners are more autonomous and confident in their learning (Chou, 2010; Elliott, 2016). Learners nowadays do not just learn from teachers, but for most of the time, they learn from their peers and online resources. Online reading or E-books could possibly create chances for learners to select their preferred types of reading materials and to read on their own pace.

To date, there are few studies examining the effects of E-book reading on EFL learners' English self-efficacy. In an EFL context, language input or output seem insufficient; their language production becomes less and less, and their levels of self-efficacy decrease little by little. Lower levels of English self-efficacy would possibly lead to unsatisfactory performance; the performance would make the levels of self-efficacy lower and lower. With the intention to understand the implementation of E-book reading activities, the purpose of the study is to investigate whether E-books can enhance EFL learners' levels of English self-efficacy. This study, thus, is guided by the following three research questions (RQs):
RQ1. Is there any relationship between the participants' English proficiency and self-efficacious beliefs?
RQ2. Are the participants' self-efficacious beliefs enhanced after the E-book reading activities?
RQ3. What are the participants' perceptions about the E-book reading activities?

## Method

### Participants

The research population consisted of EFL college students from one technology college located in the northern part of Taiwan. Two classes of participants (N = 101) who enrolled in Sophomore English as a mandatory course majored in industry management, industrial design, information management, and electrical engineering. Although the two classes of learners were from different academic departments, their attitudes towards English learning and English proficiency were not significantly different from each other. On the first day of the class, they were asked to share their English learning histories with other classmates. Eight out of ten reported that they had negative feelings about English learning for they had spent so much time learning it, but they still had tremendous difficulties learning and using it. They desired to learn English well, but unsatisfying scores had made them feel hopeless.

The participants have taken Freshman English course for one academic year in the target university, who were chosen based on convenience sampling. Convenience sampling means that "members of the target population are selected for the purpose of the study" (Dörnyei, 2007, p.98). In the study, the participants from the two classes were all college sophomores taught by the same instructor-researcher. Therefore, it would be more convenient for the instructor-researcher to carry out on-site observation and apply E-book reading activities to the study. Below is the description of the participants' background in the study (Table 1).

Table 1

Description of the participants in the study

| Group | N | Age (mean) | Gender (%) | Years of English Learning | CSEPT (Range: 0-240) |
|---|---|---|---|---|---|
| 1 | 52 | 18.44 | M:59.62% F:40.38% | 9.94 | 205.37 |
| 2 | 49 | 18.63 | M:79.59% F:20.41% | 10.44 | 207.02 |

* % = percentage; M = male; F = female;
CSEPT = College Student English Proficiency Test

Moreover, based on the participants' College Student English Proficiency Test (CSEPT) results, the English level of the participants was CEFR B1 level (CSEPT score range: 170-240). CEFR A2 level, in Taiwan, was defined as the English proficiency of typical senior high school graduates; in other words, in the target college, the English proficiency of the participants was nearly equal to that of a senior high school graduate.

**The Settings**

The participants from the two classes took the Sophomore English course in a technological college in northern Taiwan. The course included four language skills: reading, writing, listening, and speaking. Different from the Freshman English, the course was to provide learners with more advanced language training. The instruction site for all the participants was a face-to-face classroom, but only the experimental group members were required to read E-books on their own from desktop computers and write down their thoughts and feedbacks. After finishing reading and writing, their thoughts and feedbacks needed uploading to the Google Drive. The Google Drive was set up for sharing information and learning from each other.

**The Pilot Study**

The major instrument (the English learning self-efficacy scale (ELSES)), which has been proved as highly reliable and valid scales (Yang, 2016), was adapted and translated into Chinese and tested for its reliability and validity. The participants in the pilot study were 35 college sophomores in Taiwan. In order to test the reliability for Taiwanese college students, a pilot study was conducted. The pilot results showed good reliability (Cronbach Alpha = .93). Before testing the reliability, ELSES was examined for content and face validity. Two EFL-related experts, who had at least five years of college English teaching experiences, and 15 college EFL learners, who had at least four years of English learning experiences, participated in the pilot study. The two experts agreed that the instruments were readable and relevant to the study purposes. All of the pilot study participants reported that they understood the questions and found them easy to answer. The results, then, showed good validity.

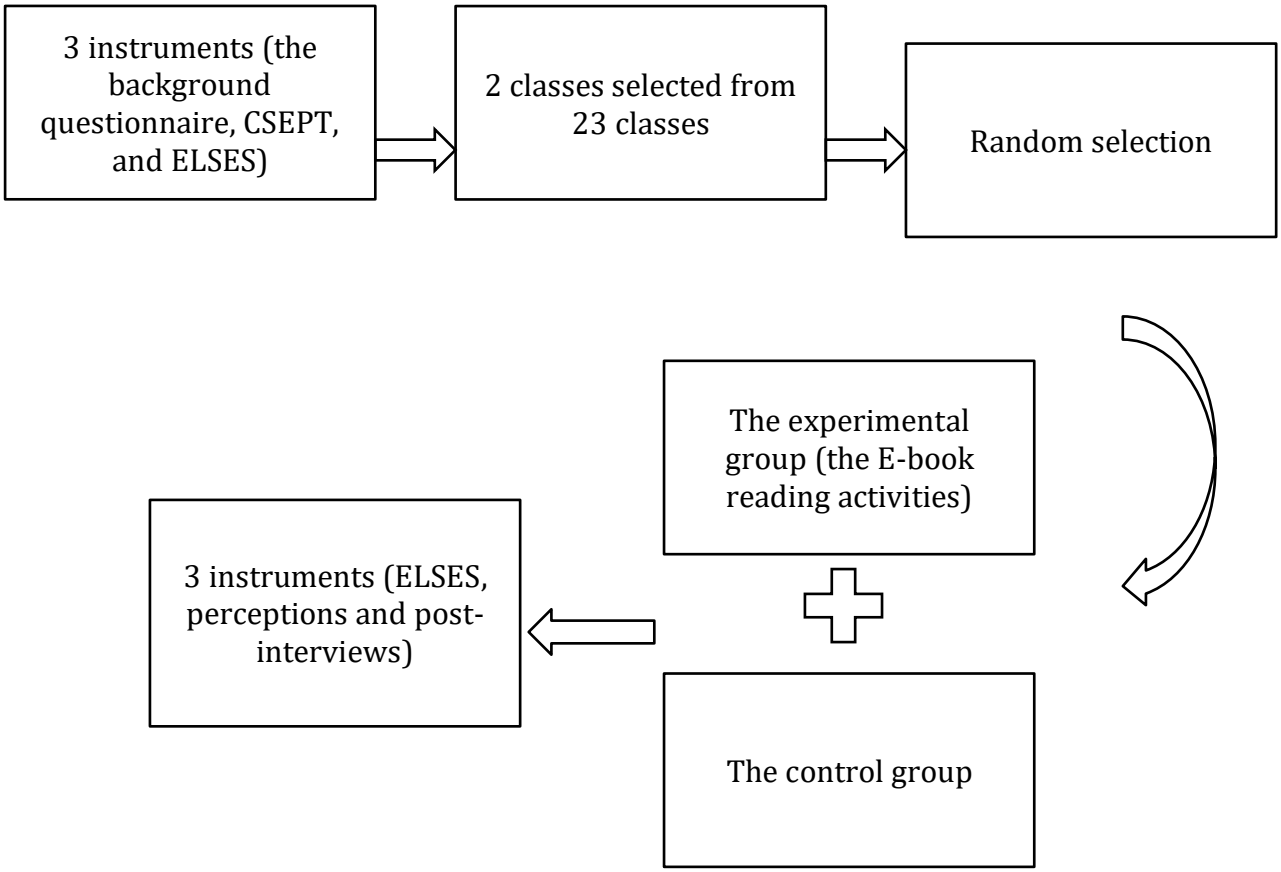
After examining the reliability and validity of the two instruments, the experimental pilot study was conducted. The pilot study participants were college sophomores (N = 30), taking a two-hour Sophomore English course instructed by the researcher. The researcher spared about twenty minutes for two weeks to apply E-books reading activities to the course. The procedure of the instruction is described as follows. First of all, the instructor spent five minutes introducing the reading activities. Second, a good collection of E-books were presented to the learners. Third, the participants were required to select a book and read on their own. Finally, they had to complete the feedbacks and upload them to the Google Drive. After the two-week study, they all reported their perceptions of this kind of learning in a more positive way.

**Research Design**

The present study integrates the features of quasi-experimental research in order to investigate the effect of E-book reading activities on EFL college learners' self-efficacy and their in-depth perceptions of this kind of learning. First of all, ELSES and CSEPT were conducted to examine the differences between the two classes randomly selected out of twenty-three classes from one college. Two classes of learners, based on the instrument results, showed insignificantly different from each other; the two classes were recruited in the study. Secondly, the E-book reading activities were applied to investigate whether there was any difference in the levels of self-efficacy between the experimental and control groups. In the study, the Bandura's Social Cognitive Model and Vygotsky's Sociocultural Theory were adopted, adjusted, and then applied to the research framework.

The learners' linguistic performance, first of all, was measured and studied by one of Taiwan's English proficiency tests, CSEPT. Secondly, the scale, ELSES, in order to measure the learners' affective domain, was administered both before and after the E-book reading activities to discover whether there were any significant differences between the two groups (the control and experimental groups). During the study, the participants from the experimental group took part in the E-book reading activities while the ones from the control group only received instruction in a traditional face-to-face context. By the end of the course (an academic semester), the participants' reading and writing performance were evaluated; their levels of English self-efficacy were investigated. Their perceptions of this kind of learning would also be analyzed through qualitative analysis. The following figure illustrates the framework of the current study (Figure 1).

Figure 1
Framework of the research design




Finally, for the sake of data validation, the teacher-researcher also kept a teaching journal to note down her observations of the experimental group, such as participation, interaction and asking for clarification. With the record of the teaching journal, the findings of the study data would be more reliable and convincing.

**Instruments**

Five instruments were used in the study to collect data. They were (a) a background information questionnaire, (b) a CSEPT test, (c) an ELSES (adapted from Huang & Chang, 1996), (d) learners' perception survey about the E-book reading activities, and (e) post-interviews. The details of each instrument are described in the following sections.

***The background information questionnaire.*** The background information questionnaire, made up of 13 questions, adapted from the background questionnaire developed by Oxford (1990, p.282). It was particularly designed to elicit the learners' information about personal data and their English learning experiences. All the questions were translated into Chinese by the researcher and answered by all the participants from the two groups.

***College Student English Proficiency Test (CSEPT).*** CSEPT was administered at the beginning of the study in order to examine the learners' general listening and reading ability.

The test was selected from the CSEPT tests designed by The Language Training & Testing Center (LTTC) with approved validity and reliability. The tests, divided into two language skills: listening and reading, were ranged from CEFR A2 to B1.

***The English learning self-efficacy scale (ELSES).*** For the purpose of examining the learners' reading self-efficacy, Huang and Chang's ESL General Self-Efficacy Questionnaire (1996) was adopted and administered in the study. It originally consisted of 29 items (a five-point Likert-type scale) asking four aspects of questions: perceived abilities, perceived aspiration, persistence, and enjoyment, perceived writing affect, and perceived reading affect. In the present study, however, all the items of the questionnaire had the word 'English' added for the purpose of pointing out that English was the target language the researcher would like to examine. After modification, the questions were translated into Chinese and back-translated into English by an EFL-related expert to ensure reliability.

***The learners' perception questionnaire on the E-book reading activities.*** The questionnaire on learners' perceptions of the E-book reading activities was distributed to the participants in the experimental group one week after the study in order to recall their fresh memories and experiences. The purpose of this questionnaire was to investigate how the learners felt about this kind of learning and to investigate whether or not there would be any significant effect on their learning from their own perspectives. In order to elicit their feelings, it was an open-ended perception survey, consisting four parts: perceptions of the teacher's role and facilitation, perceptions of the E-book reading activities, and their willingness of learning English through E-books in the future. The content of the perception questionnaire was tested for its expert and face validity before actual implementation with the learners.

***The materials of the E-book reading activities.*** The reading materials selected for the study were a good collection of English picture books and graded readers published in Taiwan, along with authentic English texts and vivid images. The contents of the E-books included a variety of themes: family issues, exotic cultures, famous people, tourism, sports, and fairy tales. Each learner was provided with E-books, and he or she was able to select books to read for each class. After reading, the participants had to write their feedbacks and upload them to the Google Drive.

**Research Procedures**

The present study was a quasi-experimental study. Firstly, the two instruments (ELSES and CSEPT) were conducted to examine the differences between the two classes randomly selected out of twenty-three classes from one college. Two classes of learners, based on the instrument results, showed insignificantly different from each other; the two classes were recruited in the study. Secondly, the E-book reading activities were applied to investigate whether there was any difference in the levels of English self-efficacy between the experimental and control groups. In the study, the Bandura's Social Cognitive Model (1986) and Vygotsky's Sociocultural Theory (1978) were adopted, adjusted, and then applied to the research framework. In addition to the questionnaire, after the study, a post-interview was administered for the purpose of having a better and deeper understanding of the learners' feelings about this kind of learning and their authentic experiences.

**The EFL classroom with E-book reading activities**

First, all the learners were assigned tasks to complete in small groups which consisted of learners with different levels of English proficiency and self-efficacy. Second, each team member would do brainstorming to come up with as many ideas as possible. Third, they would present their own thoughts in small groups. Fourth, all the team members would discuss, negotiate, and then come to an agreement. Finally, each team should show their agreed solutions or answers in front of the whole class.

In the classroom with E-book reading activities, the selected reading materials were within the range of A2 to B1. As such, the learners would not be too overwhelmed but still had a little challenge to push themselves to a higher level of English learning through this instruction. Basically, the material selection was mainly based on the guidelines proposed by Krashen (1982, 1985). He claims that the difficulty level of learning materials should only be slightly higher than that of the target learners. In other words, the participants would not be easily intimidated by a tremendous number of unknown words and then easily give up reading. The i+1 principle could promote their reading motivation and ignite their passion for reading. Below is the comparison of t the experimental and control groups (Table 2).

Table 2
A comparison of the experimental and control groups

| Group A (the experimental group) | Group B (the control group) |
|---|---|
| Face-to-face instruction | Face-to-face instruction |
| In-class discussion/ interaction | In-class discussion/ interaction |
| Quizzes/ drills and practices | Quizzes/ drills and practices |
| E-book reading activities | |
| After-reading feedbacks | |

**Data Collection**

The five instruments mentioned above were used for data collection of learners' background information, a CSEPT test, an ELSES (adapted from Huang and Chang, 1996), learners' perception survey about the E-book reading activities, and post-interviews. Firstly, a CSEPT was conducted, and the results were collected for further analysis. Secondly, in addition to ELSES, the background information questionnaire was distributed to all the participants, including their personal data and English learning experiences. Lastly, the learners' perception survey about the E-book reading activities was answered by all the participants from the experimental group. After the learning, they were able to express how they felt about it and whether there was any influence on their language learning and self-efficacy.

Besides the five instruments, the teaching journal, recorded by the instructor-researcher during the research study, served as the observation of in-class E-book reading activities. Right after each class, the learners' participation, interaction, and questioning were noted

down as part of the data collection process. On-site observation serves as one of the most convincing forms of evidence in a research study (Adler & Adler, 1994). To provide different views on the participants' learning and participation, the instructor-researcher kept a teaching journal to write down her observations of the quasi-experimental study.

**Data Analysis**

As mentioned in the previous section, the five instruments were administered to collect data on the participants' English learning self-efficacy, English proficiency, and their perceptions of the E-book reading activities. The following section describes the data analysis procedures (Table 3) for each instrument.

Table 3
Summary of the data analysis

| Instruments | Statistical Analysis |
|---|---|
| Background information questionnaire | descriptive statistics/ an independent samples *t*-test |
| CSEPT | descriptive statistics/ an independent samples *t*-test/ ANCOVA |
| ELSES | descriptive statistics/ Pearson Correlation/ ANCOVA |
| Perception questionnaire about the E-book reading activities | descriptive statistics/ discourse analysis |
| The instructor's on-site journal | content analysis |

First of all, the background information questionnaire surveyed the participants' demographic characteristics and English learning experiences. Their responses were collected and analyzed by descriptive statistics. Secondly, the results of the learners' CSEPT and ELSES served as one of the variables in the study to examine the participants' English proficiency through a series of Pearson Correlation and ANCOVA tests. Thirdly, for the closed questions of the learners' perceptions, their answers were analyzed by descriptive statistics (mean and Standard Deviation) and t-tests, while the answers to the open questions were categorized by a systematic content analysis by two raters (EFL teachers) in order to achieve reliability. Lastly, the data from the instructor's on-site journal, serving as a cross-reference to the research findings related to the participants' perceptions of the E-book reading activities, were categorized by qualitative analysis.

**Results**

The participants of the study consisted of 101 EFL college students in northern Taiwan. Their average age was 18.54, and the average length of English learning was 10.19 years. The participants' perceptions of the importance in learning English were close to 'very important' (M = 2.82) on the scale (very important = 3; important = 2; not so important = 1). They uploaded a total of 320 E-journal writing entries during one semester in 2016. The study results, in the following part, are presented in accordance with the three research questions respectively.

ELSES has four parts: perceived abilities, perceived aspiration, persistence, and enjoyment, perceived writing affect and perceived reading affect. Table 4 shows the level of English self-efficacy by all participants. On average, their overall English self-efficacy is at a medium level (mean = 3.16). The mean scores of English self-efficacy from high to low are Part 2 (mean=3.76), Part 4 (mean = 3.23), Part 1 (mean = 3.06), and Part 3 (mean = 2.59).

Table 4
Levels of English Self-Efficacy by All Participants

**Descriptive Analysis**

| | n | Min. | Max. | Mean | SD | Rank |
|---|---|---|---|---|---|---|
| Part 1 | 101 | 1.50 | 4.40 | 3.06 | .606 | 3 |
| Part 2 | 101 | 2.00 | 7.86 | 3.76 | .767 | 1 |
| Part 3 | 101 | 1.00 | 5.00 | 2.59 | .815 | 4 |
| Part 4 | 101 | 1.17 | 5.00 | 3.23 | .716 | 2 |
| All | 101 | 1.48 | 4.45 | 3.16 | .568 | |

Note. Part 1: perceived abilities; Part 2: aspiration, persistence, and enjoyment; Part 3: writing affect; Part 4: reading affect

Among the four parts of English self-efficacy, specifically speaking, the highest level one (aspiration, persistence, and enjoyment) and the lowest one (writing affect) were also examined and illustrated in Table 5 and Table 6. For the part of aspiration, persistence, and enjoyment, the highest scores (mean = 4.06) were gained for Q59 (When I decide to write something in English, I go ahead and do it) while the lowest ones (mean = 3.59), Q75 (If I can't understand English reading the first time, I keep trying until I can). For the part of writing affect, the highest scores (mean = 2.94) were gained for Q53 (I am not very good at learning how to write English) while the lowest ones (mean = 2.19), Q58 (Sometimes I think that I am no good at writing in English). Apparently, the participants were lack of self-confidence in English writing.

Table 5 presented the different levels of English self-efficacy possessed by the two groups (Group 1= the experimental group; Group 2= the control group). The results showed that the participants of Group1 had a slightly higher level of English self-efficacy for all the parts of the self-efficacy scale and for each specific part, compared with Group 2.

Table 5
Levels of English self-efficacy by different groups of participants

**Descriptive Analysis**

| Group | | n | Mean | SD | Std. Error |
|---|---|---|---|---|---|
| All | 1 | 52 | 3.19* | .58 | .087 |
| | 2 | 49 | 3.08 | .56 | .096 |
| Part 1 | 1 | 52 | 3.06* | .63 | .095 |
| | 2 | 49 | 3.03 | .58 | .099 |
| Part 2 | 1 | 52 | 3.92* | .82 | .124 |

| | | | | | |
|---|---|---|---|---|---|
| | 2 | 49 | 3.53 | .63 | .109 |
| Part 3 | 1 | 52 | 2.64* | .85 | .128 |
| | 2 | 49 | 2.52 | .77 | .132 |
| Part 4 | 1 | 52 | 3.21* | .68 | .103 |
| | 2 | 49 | 3.19 | .77 | .131 |

Note. *= higher level of English self-efficacy

In order to examine the participants' level of self-efficacy as to how they perceive their English proficiency, a t-test was conducted. The results displayed in Table 6 indicate that there was no significant difference between the two groups (P = .394 > .05). In other words, the two groups did not differ significantly from each other in their level of English self-efficacy.

Table 6
An independent samples t-test of English self-efficacy by the two groups

**Independent Samples Test**

| | *t* | *df* | *Sig.* (2-tailed) |
|---|---|---|---|
| All | .858 | 72.10 | .394 |
| Part 1 | .232 | 73.63 | .817 |
| Part 2 | 2.39 | 75.99 | .082 |
| Part 3 | .627 | 73.98 | .532 |
| Part 4 | .132 | 66.74 | .895 |

*Note*. * = p < .05; Part 1: perceived abilities; Part 2: aspiration, persistence, and enjoyment; Part 3: writing affect; Part 4: reading affect.

**RQ1. Is there any relationship between the participants' English proficiency and self-efficacious beliefs?**

Table 7 illustrates the relationship between English proficiency and English self-efficacy. The results showed that English self-efficacy were positively correlated with English proficiency (r = .353, p = .002 < .01).

Table 7
Pearson correlation coefficient of English self-efficacy and English proficiency

**Correlations**

| | | English Proficiency | English self-efficacy |
|---|---|---|---|
| English Proficiency | Pearson Correlation | 1 | |
| | Sig. (2-tailed) | | |
| English self-efficacy | Pearson Correlation | .353** | 1 |
| | Sig.(2-tailed) | .002 | |

*Note*. ** $p < .01$;

**RQ2. Are the participants' self-efficacious beliefs enhanced after the E-book reading activities?**

Table 8 presents the ANCOVA results of English self-efficacy by the two groups. The results showed that there were significant differences between the two groups in the levels of self-efficacy after the study (F (1,75) = 7.686, p = .007 < .05). Table 9, moreover, displays that Group 1's mean scores of English self-efficacy were significantly higher than those of Group 2 (p = .007 < .05).

Table 8
ANCOVA results of all parts of English self-efficacy

**Tests of Between-Subjects Effects**

Dependent Variable: self-efficacy

| Source | Type III *SS* | *df* | *MS* | *F* | *Sig.* | Partial Eta. Squared |
|---|---|---|---|---|---|---|
| Corrected Model | 16.389[a] | 2 | 8.195 | 35.780 | .000 | .488 |
| Intercept | 4.855 | 1 | 4.855 | 21.198 | .000 | .220 |
| Part A Strategies | 14.534 | 1 | 14.534 | 63.458 | .000 | .458 |
| Group | 1.760 | 1 | 1.760 | 7.686 | .007** | .093 |
| Error | 17.177 | 99 | .229 | | | |
| Total | 786.457 | 101 | | | | |
| Corrected Total | 33.566 | 100 | | | | |

*Note*. R Squared = .488 (Adjusted R Squared = .475); ** $p < .01$.

Table 9 Results of paired Comparison regarding Part A strategies

**Paired Comparison**

Dependent Variable: Part A Strategies

| (I) Group | (J) Group | Mean Difference(I-J) | Std. Error | Sig.[a] |
|---|---|---|---|---|
| 1 | 2 | .303** | .109 | .007 |
| 2 | 1 | -.303** | .109 | .007 |

*Note*. **$p < .01$.

**RQ3. What are the participants' perceptions about the E-book reading activities?**

The students' statements showed that their attitudes towards learning English through E-book reading were positive. From being unconfident to confident, they had more positive feelings about English learning. More importantly, they knew more about how to learn a target language effectively and efficiently in an E-book reading environment. In other words, through E-book reading, the learners had greater control of their own learning, they were able to select their preferred genres, and they became more self-confident in their English learning.

To be more specific about the learners' perceptions, the following statements are direct quotes translated into English from the perception questionnaire.

S1: After reading picture books, I started to read more in English. Before I did not have the confidence to read English books. But now, I think it is OK for me to do so.

S2: When I was a high school student, I had no chance or motive to read English picture books. At first, I thought the picture books were for kids. I should not read them. But after reading them, I began to enjoy reading and to be more involved in English learning.

S3: I always felt stressful when I need to read or write in English. I had learned English for so many years, and I knew learning English was important. However, I did not know how to improve my English. This semester, my teacher asked us to read picture books. At first, I still felt a little bit nervous, but after reading for several times, I took English reading as a kind of habits.

S4: I like speaking English, but I do not like English reading and writing. Reading and writing are not interesting. When I was in high school, I always got bad scores in my English reading and writing. But after reading English picture books, I found them so interesting and appealing. The stories are closer to my life, and the image of the characters are so lovely. I think I would like to read picture books on my own in my free time.

S5: I always think I am not good at English. I try to avoid learning English. But our teacher asked us to read English picture books, and I tried to read on my own. After

several trials, I think English learning is not so intimidating or boring. I feel quite happy that I can read an English story.

## Discussions

The levels of English proficiency do make significant differences in the level of English self-efficacy. It could be suggested that more proficient learners usually perform better; therefore, the sense of achievement possibly makes the learners feel more self-confident in their learning. The results above are in accordance with previous studies on language self-efficacy (Bandura & Schunk, 1981; Greene et al., 2004; Shell & Murphy, 1989; Zimmerman & Bandura, 1994) which presented that higher-level English learners are those with higher levels of self-efficacy. Lower-level learners possess rather lower self-confidence in learning a target language. In most cases, they would give up learning easily when facing difficulties. Self-confidence is one of the main factors influencing language learning. From the views of Krashen (1985), a learner's affective domains include motivation, attitude, self-confidence, and anxiety. If an affective filter develops, learning input would be inhibited. On the other hand, if the filter is low, the input would possibly reach the acquisition device and acquisition would take place. While the learners were reading English picture books, their affective filter was low, and they started to engage in active reading and meaningful learning.

## Conclusions

Given the above results, the study presents that the participants' levels of English self-efficacy are significantly enhanced after the E-book reading activities, and there is a positive correlation between English self-efficacy and performance. In a technology-assisted context, they show higher levels of confidence in their learning (Chou, 2010). It is certainly not easy to learn a language in an EFL context for the insufficiency of language input and output. EFL learners do not possess a context in which they could obtain enough language input and output and a context in which they could interact with different cultures, including inner sub-cultures and target cultures. However, fortunately, with the assistance of technology, language learning would not be restricted in a classroom context, but to a larger space in which the learners would have more equitable opportunities for language input and output (Warschauer, 1996); moreover, they interact more with each other (Al-Fadda & Al-Yahya, 2010; Chun, 1994; De Andres Martinez, 2012; Ducate & Lomicka, 2008; Elola, 2010; Goertler, 2009; Huang, 2013; Kern, 1995; Kuzu, 2007; Sharma, Ke, & Xie, 2010; Shih, 2013; Warschauer, 2009; Yang, 2009). They could have more opportunities to expand their horizon and to practice the target language through E-book reading. EFL learners' levels of English self-efficacy would be enhanced in this kind of learning environment which makes their world of language input and output wider and wider.

## Implications and Limitations

The findings of this current study at least suggest three pedagogical implications. First of all, for Taiwanese language learners, E-book reading could build up their levels of English self-efficacy or confidence. Secondly, for language teachers, the study presents the possibility of

leading learners to an authentic world full of diverse sorts of resources for them to discover in a more pleasant atmosphere. Most importantly, E-book reading activities could be tailored to meet different types of curricula. Different genres of writing would raise learners' interests, and they could have chances to write for different purposes and contexts. For EFL curriculum designers, lastly, should emphasize the importance of children's literature or picture books.

The limitation, firstly, is the external validity or generalizability of the study. The participants in the present study were not representative enough of the whole Taiwan EFL population to make generalizations from this study. Thus, it is suggested that future researchers include participants from diverse backgrounds. Secondly, the study time was not long enough for investigating in-depth reading or writing performances; therefore, it would be better to have it at least one academic year long in order to explore more about the learners' linguistic performances. All in all, E-book reading activities, more or less, serves as a door for language input and output opportunities and English self-efficacy enhancement.

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