DEVELOPING MODULE OF SCIENCE PROCESS SKILLS IN THE TOPIC OF MOLARITY BASED ON OPEN-INQUIRY BASED LEARNING STRATEGIES

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DEDICATION

This thesis is dedicated to all of my family members (my parents and my sisters) specially my father Prof DR. Ameen Aledresi, in addition to my teachers and of course my supervisor AP. DR. Johari Bin Surif as well as everyone that stood with me during this period of time.

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ABSTRACT

Science process skills enable students to explain phenomena, to answer questions, to construct hypotheses and to learn information. They are vital to the development of ideas and enhance scientific learning. Therefore, this study aimed to (i) determine the level of basic science process skills among secondary students, (ii) determine the level of integrated science process skills among secondary students, (iii) develop the "Module of Science Process Skills in the Topic of Molarity Based on Inquiry Based Learning Strategies" and (iv) evaluate the suitability of the "Module of Science Process Skills in the Topic of Molarity Based on Inquiry Based Learning Strategies" to use in chemistry classroom. Science Process Skills Test was used to determine the level of basic science process skills and integrated science process skills, among 100 of secondary students in Skudai schools. The instruments contain 30 questions that was related to Molarity subject implementing science process skills and all the scientific questions were multiple choice questions. Since this study has taken place during Covid-19 period, all the questions forms were distributed online using Google forms. This study uses descriptive analysis to analysis the data, data were analysed to determine the level of mastery of students' science process skills based on the percentage achieved by determining the classification of science process skill levels according to the average overall percentage achieved by students. The findings show that, the secondary students had moderate level in both Basic and Integrated science process skills. However, the percentage of integrated science process skills were lower than basic science process skills as well as moderate level in understanding Molarity subject. This study had developed a Module of Science Process Skills in the Topic of Molarity Based on Open Inquiry Based Learning Strategies using ADDIE (analysis, design, development, implementation and evaluation) model. The Module was validated by three experts to know the suitability of using the Module with secondary school students. All of the validators have agreed on that the Module of Science Process Skills in the Topic of Molarity Based on Open Inquiry Based Learning Strategies is suitable to be used in the future for teaching and learning process. The findings of this study can help teachers to focus more on the skills that the students show low level in, such as making interference, communicating skills, controlling variables, interpreting data and experimenting. As well as recommends the Chemistry curriculum to focus more on the Molarity topic by relating it to real daily life, giving more exercises on it, using the inquiry teaching and learning strategy and implementing the science process skills into teaching and learning process.

ABSTRAK

Kemahiran proses sains membolehkan pelajar menjelaskan fenomena, menjawab soalan, membina hipotesis dan mempelajari maklumat. Ia adalah penting untuk pengembangan idea dan meningkatkan pembelajaran saintifik. Oleh itu, kajian ini bertujuan untuk (i) menentukan tahap kemahiran proses sains asas dalam kalangan pelajar menengah, (ii) menentukan tahap kemahiran proses sains bersepadu di kalangan pelajar menengah, (iii) membina "Modul Kemahiran Proses Sains dalam Topik Molariti Berdasarkan Strategi Pembelajaran Berasaskan Inkuiri" dan (iv) menilai kesesuaian "Modul Kemahiran Proses Sains dalam Topik Molariti Berdasarkan Strategi Pembelajaran Berasaskan Inkuiri" untuk digunakan di dalam kelas kimia. Ujian Kemahiran Proses Sains digunakan untuk menentukan tahap kemahiran proses sains asas dan kemahiran proses sains bersepadu, dalam kalangan 100 pelajar menengah di sekolah-sekolah Skudai. Instrumen mengandungi 30 soalan yang berkaitan dengan tajuk Molariti yang melaksanakan kemahiran proses sains dan semua soalan saintifik adalah soalan pilihan aneka pilihan. Oleh kerana kajian ini dilakukan dalam tempoh Covid-19, semua borang soalan diedarkan dalam talian menggunakan borang Google. Kajian ini menggunakan analisis deskriptif untuk menganalisis data, data dianalisis untuk menentukan tahap penguasaan kemahiran proses sains pelajar berdasarkan peratusan yang dicapai dengan menentukan klasifikasi tahap kemahiran proses sains mengikut purata peratusan keseluruhan yang dicapai oleh pelajar. Hasil kajian menunjukkan bahawa pelajar sekolah menengah mempunyai tahap sederhana dalam kemahiran proses sains Asas dan Bersepadu. Namun peratusan kemahiran proses sains bersepadu lebih rendah daripada kemahiran proses sains asas dan tahap sederhana dalam memahami tajuk Molariti. Kajian ini telah mengembangkan Modul Kemahiran Proses Sains dalam Topik Molariti Berdasarkan Strategi Pembelajaran Berasaskan Inkuiri Terbuka dengan menggunakan model ADDIE (analisis, reka bentuk, pembangunan, pelaksanaan dan penilaian). Modul tersebut disahkan oleh tiga pakar untuk mengetahui kesesuaian penggunaan Modul dalam kalangan pelajar sekolah menengah. Semua pakar telah bersetuju bahawa Modul Kemahiran Proses Sains dalam Topik Molariti Berdasarkan Strategi Pembelajaran Berasaskan Inkuiri Terbuka adalah sesuai untuk digunakan untuk proses pengajaran dan pembelajaran. Hasil dapatan kajian ini dapat membantu guru untuk lebih fokus pada kemahiran yang ditunjukkan oleh murid pada tahap rendah, seperti membina inferens, kemahiran berkomunikasi, mengawal pemboleh ubah, mentafsirkan data dan bereksperimen. Kajian mencadangkan kurikulum Kimia untuk lebih fokus pada tajuk Molariti dengan mengaitkannya dengan kehidupan seharian yang sebenar, memberikan lebih banyak latihan, menggunakan strategi pengajaran dan pembelajaran inkuiri di samping menerapkan kemahiran proses sains ke dalam proses pengajaran dan pembelajaran.

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LIST OF ABBREVIATIONS

SPS	-	Science Process Skills
BSPS	-	Basic Science Process Skills
ISPS	-	Integrated Science Process Skills
OI	-	Open Inquiry
UTM	-	Universiti Teknologi Malaysia

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Chemistry includes three main branches: knowledge, attitudes and values as well as scientific process skills. Knowledge of the properties, composition and reactivity of science and pundits of matter can be described by knowledge in chemistry. Chemistry as a knowledge body refers to science such things as information, concepts, law, theory and facts. Chemistry covers anything from the small components to complex structures. The atom, Molarity and the particles are the main unit or chemistry components. While the attitudes or values of chemistry have decided the control to anticipate future behaviors like the subject and career inclinations of learners (Koballa, 1988; Osborne, Simon & Collins, 2003), and the relationship existing between demeanor and scholastic accomplishment (Schibeci, 1984; Shrigley, 1990; Weinburgh, 1995; Osborne & Collins, 2000). In their meta-analysis of the state of mind related variables that foresee future behaviors, Glasman & Albarracín (2006) concluded that there's a relationship between states of mind and future behaviors; that's, attitudes are a potential for predicting future inclinations, especially if the interaction between members and the attitude question is coordinated (i.e. objects relating to an attitude such as science lessons) (Winnie & Lazarus, 2014).

There are also a number of methods in chemistry. The method is the process or strategy of delivering a body of knowledge. In the process or strategy, students learn how to do chemistry by observing, classifying objects, measuring etc. Chemistry is also a way to understand (Rezba, Sprague, McDonnough, & Matkins, 2007) and to teach children how to do chemistry better than to learn news, concepts and speculations (Martin, 2009). Chemistry helps its special abilities by emphasising the hypothesis, physical world control and data thinking. The logical approach, logical consideration

and fundamental consideration were used at various times to represent this knowledge of the science process.

In the field of chemistry currently, the concept of science processing is commonly used. These abilities are popularised by the Science Process Skills (SPS), education programme as a whole, suitable for many scientific disciplines and intelligent to investigators' behaviour (Ozgelen, 2012). SPS has assembled prepared skills into two basic and integrated knowledge-based scientific processes. The basic SPS management skills (less complex) allow a facility to learn the integrated SPS (more complex) skills of the coordinates. The training and learning of science is not only important for the logical strategy but also valuable opportunities to learn about the nature of science. This capacity is divided into two categories; basic and integrated abilities are based on mental and physical considerations. These skills should have been developed and used in various chemical exploration settings by each chemistry instructor and these capabilities should be adequately exchanged by means of compelling chemistry education strategies. It is difficult to achieve the abilities without exact understanding. (Chatchai, Nantarat &Witat, 2015).

In this research we are going to focus on the science process skills (SPS) which we are going to mention it types in details, science process skills as the building squares from which reasonable science tasks are being developed must be considered by the unused national science curricula and the way they are communicated in reading material.

1.2 Background of the Problem

Science processes skills are a key purpose in chemistry continuing education because they are not only required by scientists, but also by every citizen to be a scientifically literate person able to work in society worldwide. Furthermore, these skills are suitable for all elements of society and individuals should therefore know how to use them in their way of life when competing with Huppert et al. (2002). The knowledge of the science process skills helps students understand wonders, answer

questions, create speculation and find information (Martin, 2009). They are essential in considering (Harlen & Qualter, 2004) and they enhance academic achievement in applied science (Aktamis & Ergin, 2008).

But what is science process skills at that point? This is a crucial point for research, as many instructors have a "poor conceptual understanding of the skill in science handling (which) extends from the absence of a sense of tautology" (Mbewe, Chabalengula, & Mumba, 2010). While SPS is very important in preparing students to solve the problem in their lives, many researchers have found it always difficult for students to learn SPS, particularly in basic and integrated science processes (Mbewe, Chabalengula, & Mumba, 2010).

1.2.1 Students Difficulties in Basic Science Process Skills

Various inquiries into the educational and securing skills in the basic science process skills have been chanted. The basic science process skills of the 700 secondary school secondary studies with no extraordinary handling expertise have been studied in Padilla, Cronin and Twiest (1985). They have found that 10% of the study results have been over 90% restatement. Abu Hassan and Rohana (2003) investigated the acquisition of scientific process skills in chemical science between 300 frames for students in Skudai from seven high schools using random samples of the schools. From all contexts two basic science process skills (i.e. prediction and inferencing) have been measured using a structured-item science-process skills test that contains 0.90 reliability. The findings show that students have achieved a total of 54.26% cruel science and, in particular, 62.50% of forecasts, 49.00% of inferences, in lower order. A number of other researchers such as Kiu Ling Feng (2006) carried out a study to assess the level of integrated know-how in the science process skills. Based on these studies, it is clear that there is evidence of difficulties among students to master these basic science process skills. Thus, the study of students' mastery of basic science process skills will be given focus in this study.

1.2.2 Students Difficulties in Integrated Science Process Skills

Integrated science processes skills includes controls variables, defining operationally and formulating hypothesis, interpreting data, experimenting and make a conclusion. These skill is very important in explaining and examining all phenomena in the environment. However, many researchers found that the students' management of these skills is difficult, for example research in Western Australia shows that many high school students have difficulty in designing a controlled variable (Garnett, Tobin & Swingler, 1985; Tobin & Capie, 1980).

Kiu Ling Feng (2006) analysed the level of integrated science process skills of hundred students who have studied science, chemistry and materials science in secondary school in Skudai, Johore at Universiti Teknologi Malaysia. Based on these studies, it is clear that there is evidence of difficulties among students to master these basic science process skills. Thus, the study of students' mastery of basic science process skills will be given focus in this study. Samini (1986), using the Test of Integrated Process Skills (Dillashaw & Okey 1980) and Test of Integrated Scientific Process Skills II, investigated the five integrated scientific process knowledge, specifically controlling variables, hypothesising, defining operationally, interpreting data, and experimenting by an instrument with a reliability of 0.85 (Burns et al., 1985). The results show that the generalised acquisition of integrated science process skills has been "direct" at 20.21 (57.68 percent). In addition, it was found that gender and the Malaysian and Chinese students did not differ critically in terms of overall integrated scientific processes skills.

The difficulties are limited by the integrated nature of this phenomenon, which neither student can characterise completely. Literally and metaphorically, any operational definitions can be used, but using operational definitions similar to those in use and which are consistent with documented reference keeps a strategic distance from the beginning battle. In summary, the surveying of local integrated science process skills studies shows that students, regardless of their secondary or graduate background, still have an adequate level of authority in science processes skills (i.e., a minimum 67 percent of overall cruel rates), especially those classified as integrated

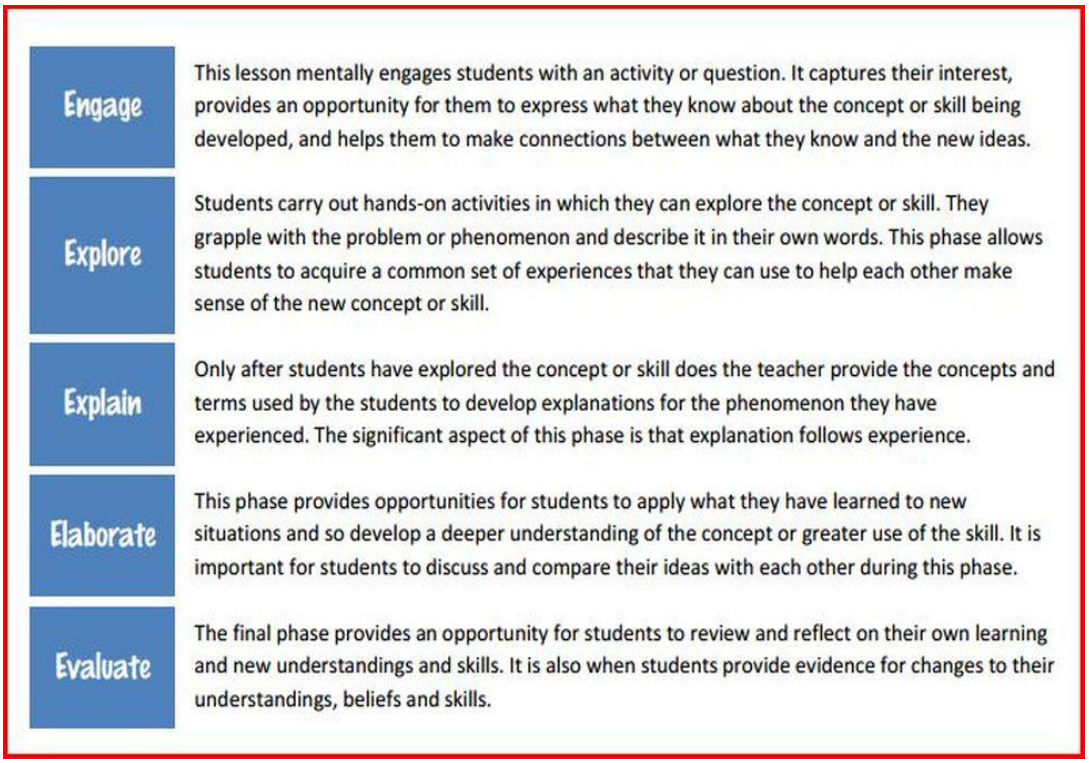
scientific process skills (Ong, Wong, Sopia, Sadiah, Asma & Zahid, 2012). Based on these studies, it is also clear that there is evidence of difficulties among students to master these integrated science process skills. Thus, the study of students' mastery of integrated science process skills will be given focus in this study. Recognizing the existence of these difficulties, effective learning strategies are needed to improve science process skills among students.

1.2.3 Effective Learning Strategies to Improve Students' Science Process Skills

Effective learning strategies have an important role to improve students' basic and integrated SPS. One of the teaching strategies that is often suggested to improve SPS is inquiry-based learning (Bruner, 1978; Burns et al., 1985). The inquiry-based learning demonstrate risen within the 1960s, amid the "discovery learning" development and depends upon the thought that individuals can memorize by investigating scenarios and issues and through social encounters. Instead of having to memorize data from printed materials, educates empowered their understudies to conduct experiments that would fulfil their interest, offer assistance them broaden their information base, and create their aptitudes and mental outlines (Karamustafaoglu, 2011).

According to Khalaf (2018), there are 4 types of inquiry-based learning, namely guided-inquiry, confirmation-inquiry, structured-inquiry, open-inquiry. Among these four types of inquiry, open-inquiry has the most dominant potential to increase student SPS. Open-inquiry allows students to plan their own investigations, develop hypotheses, control variables, plan procedures, collect data, analyse data and make conclusions. Teachers only act to present problems and act as facilitators who support students in carrying out investigations and building concepts from investigations carried out. Among the open-inquiry models that are often used include Model 5E (Table 1.1).

Table 1.1 Model 5E based on open-inquiry learning



Although Model 5E based on open-inquiry learning is often proposed to improve student SPS, many studies have shown that it is rarely implemented. Teachers are more likely to use confirmation, and structured-inquiry. Factors of time and lack of confidence of teachers to implement open-inquiry learning many constrain the implementation of open-inquiry teaching like this Model 5E (Pedaste et al., 2015). Therefore, research on open-inquiry learning needs to be implemented. The question is how to implement this strategy in chemistry classroom to enhance students' SPS. Many researchers suggest to use module to apply these strategies in chemistry classroom (Meyscr, 2010).

1.2.4 Module to Improve Students' Science Process Skills

An organised collection of materials displayed jointly would be a module. A Module can be used to support a course objective, a subject, a concept, or a subject. Modules are educational media or tool that students can use to learn independently with little assistance from others (Yudhi et al., 2010). The conclusions assert that the

learning process requires a module to supplement the student handbook, with inspiration and interest of students being one of the characteristics of a medium of learning. Improvements to learning modules are expected for self-learning students, so that the module can assist in persuading students to learn and move forward with their learning outcomes. If the benefits of module can make the learning process more curious and intuitive, it can be done anytime and anywhere, and it can advance the quality of learning (Sarwanto, Sengky, Imam & Sukarmin, 2017).

This study is aiming to develop a module of science process skill by using open inquiry learning (Embedding SPS into phases of 5E Model), and it is using one of the important secondary school chemistry subject, which is Molarity. The reason after choosing this subject is that, Molarity can be very flexible subject to be used and can be applied easily in the chemistry labs. This topic is very relevant to be chosen realizing its importance as a foundation in most of the chemistry concepts that students learn in school up to tertiary level. The topic also has a variety of experiments that can highlight science process skills while studying it. Thus it is highly relevant to be selected in this study that focuses on topics that can highlight students ' science process skills.

1.3 Problem Statement

Normally in our minds, the science process skills happens. When we consistently take the steps in our analysis, the science process skills can be used to find out how our questions can be answered. The science process skills are not only valuable in science, it requires basic thinking under any circumstances. The knowledge of the science process incorporates qualities of observing, measuring quantities, sorting and classification, inferencing, prediction, evaluation and communication. However, there are some challenges in managing the ability to engage in chemistry study and be beneficial, the ability to coexist in productive harmony with local and global communities, and the ability to lock in independent, inventive, and creative thinking. And fundamental consideration, and the ability and enthusiasm of converting and self.

The state of science process skills could therefore create a useful basic education framework, creating reliable citizens with basic skills, skills and values for both life-long learning and employment. Based on the conceptual system of the science curriculum, the abilities of the science process create logical education between undergraduates to prepare educated and participating citizens who can make judgements and choices concerning the applications of social, logical and social information. Wellbeing, or effects of nature. It coordinates science and innovation in the areas of civic, individual, social, financial and values and morality.

Although it is acknowledged that science process skills are very important in life, but previous studies have shown that there are various difficulties among students to master them. Thus, the government has formulated an integrated secondary school curriculum and a standard secondary school curriculum that focuses on the development of students' science process skills. It raises the question, are there still difficulties for students in science process skills after the reform of science curriculum including chemistry that has been implemented by the government? Therefore, a study on these science process skills needs to be conducted to answer these questions. That is why this study is aiming to use the Science Process Skills (SPS) so as to improve student learning specially students understanding to the Chemistry subject.

Through using the basic science process skills (Observation, Communication, Classification, Measurement, Inference and Prediction) and integrate science process skills (Controlling variables, Defining operationally, Formulating hypotheses, Interpreting data, Experimenting and Formulating models), and that by applying it as an Inquiry based learning designed module to one of the schools most common Chemistry subjects which is Molarity, the Chemistry subject is one of the scientific subject that students need some help to be understood in the probable way and easy in same time in addition to all that can be related with the real life tasks (Cardellini, 2012), and since recurring topic in the literature is concern over the challenges experienced in learning about the molarity (Raviolo, Farré, & Schroh, 2021). For that this study is using Molarity subject, since not many researches have been done about this topic and using it to enhance students SPS using a module that based on open inquiry-based learning.

1.4 Objective of The Study

The objectives of the study are:

1. Determine the level of basic science process skills among secondary students.
2. Determine the level of integrated science process skills among secondary students.
3. Develop the "Module of Science Process Skills in the Topic of Molarity Based on Inquiry Based Learning Strategies".
4. Evaluate the suitability of the "Module of Science Process Skills in the Topic of Molarity Based on Inquiry Based Learning Strategies" to use in chemistry classroom.

1.5 Research Questions

The research questions of the study are: -

1. What is the secondary student's level in basic science process skills?
2. What is the secondary student's level in integrated science process skills?
3. Is the "Module of Science Process Skills in the Topic of Molarity Based on Inquiry Based Learning Strategies" suitable to use in chemistry classroom?

1.6 Significant of the Study

In this research we will discuss about the significant of this study to the students as well as the significant of this study to the teachers.

1.6.1 Significant of the Study to Students

From this study, we will know the level of basic science process skills and integrated science process skills of secondary schools students as well as the difficulties that students face to master the science process skills and what are the important of science process skills in the students Chemistry Learning.

1.6.2 Significant of study to Teacher

From this study, we will know what are the important of open inquiry learning strategy in chemistry teaching as well as implement it in to the 5e module to enhance the teaching process using science process skills, we will apply the module in molarity subject as it is one of secondary school chemistry subject.

1.7 Theoretical Framework

This study uses theory of constructivism. Constructivism can be a learning theory. It is not a strategy for guidelines (Cobb, 1994). Piaget's constructivism hypothesis argues that persons create information based on their discussions and form meaning. This theory secured speculation on learning, education strategies and change in education (Piaget, 1965). There is a greater concern that students have to do more than listen to their understanding in a changing environment. Active education can be a major part of the learning process and the interaction (active learning) of most learning models are seen as a vital component. Paulson and Faust (2010) allude in a

classroom to the active learning as anything that students do other than to a professor's address inactively. This includes everything other than listening hones, which help students to absorb what they hear. To be briefer, students react to elements of speech, complex experiments, where students apply elements of course to "real life" situations and/or modern subjects.

Chickering and Gamson (1987) recommend that they need more than just listen to students in order to be effective: they need to listen, type in, discuss and participate in issues and participate in co-operative learning and group exercises. Most critically, students must participate in higher order thinking work such as examinations, amalgamations and evaluations in order to be actively included. The constructivist theory of Bruner recommends that it is convincing to take a progression from active representation when confronted with modern material; this is reasonable for learners. Bruner (1978) thought that it was not the instructor that told them that the primary success of creating a coding framework was to find it. The revelation learning concept states that students themselves develop their own knowledge (moreover known as a constructivist approach).

The results of research carried out by Ramnath and Sivakumar (2018) show that the constructivist methodology of learning improved the science- process skills among secondary students. A further study (Ramnath, 2014) has shown us that learning techniques based on constructivism make acquisitions of science process skills easier. The competences are interrelated. Constructivism can be a hypothesis developed by the combination of reasoning, psychology and science to confirm the science process skills (Ramnath, 2014).

The 5E Model which consist of Engagement, Exploration, Explain, Elaboration, and Evaluation (Bybee et al, 2006), is one of the constructivist show education strategies that are regularly used in educational programmes in the field of science and education. Furthermore, the 5E instruction demonstration was arranged with course books, exercise manuals and science lesson manual of teachers (Necati HIRÇA, 2015).

1.8 Conceptual Framework

This study is aiming to use the constructivism theory by Piaget (1965), as a design for this research and that with the use of Open-Inquiry Based Learning in the Science Process Skills developed module Embedded by 5E Model phases. Since this study is focusing on Chemistry subject especially the Molarity subject, it will discuss the suitability of the Module of Science Process Skills (SPS) in the topic of Molarity based on Inquiry Learning Strategies. All of the process is summarized in (Figure 1.1).

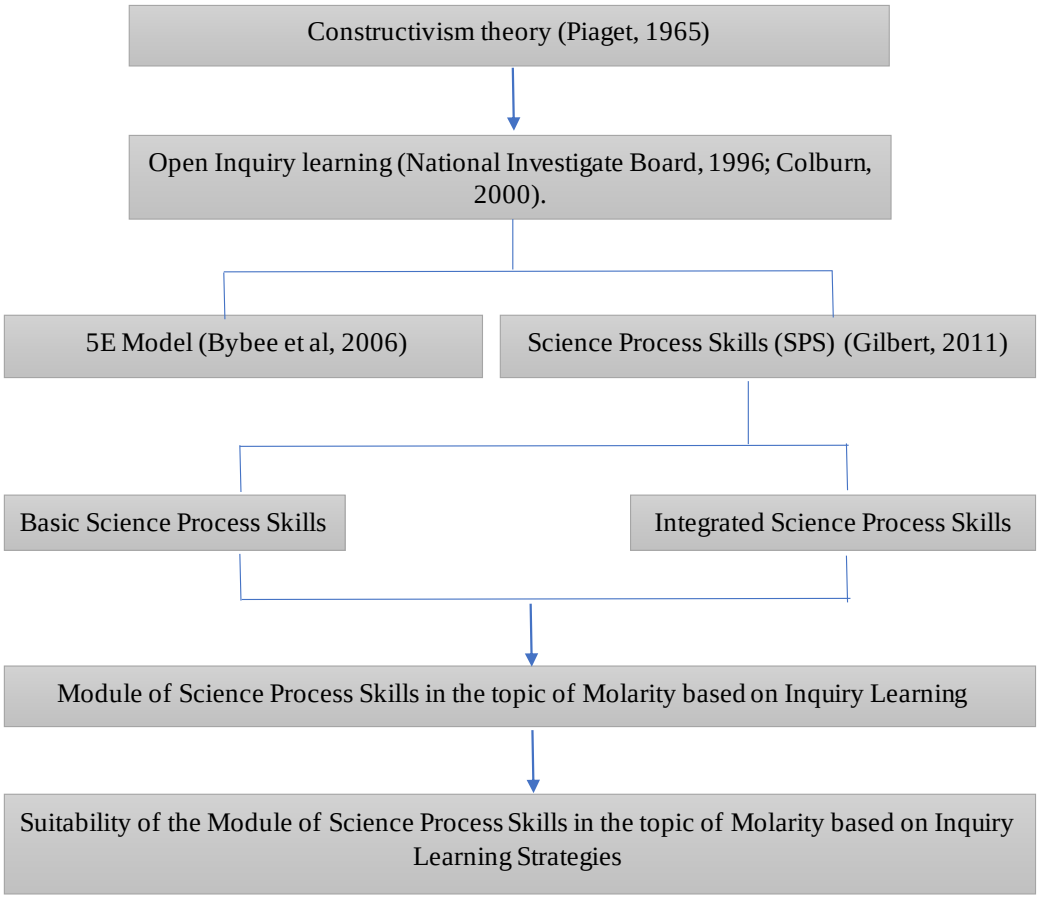


Figure 1.1 Conceptual framework

1.9 Operational Definitions

This study contains several terminologies to be defined so as to be achieving the conditions of the study.

1. Science Process Skills

Science process skills, according to Ozgelen (2012), are abilities that researchers use to create information in order to solve problems and identify outcomes. Huppert, Lomask and Lazarowitz (2002) conclude that science process skills are the "major objective of science education because they are not only necessary for scientists, but are needed by every individual to finish off an intelligent and educated person" who can work in the international society (p. 807). sci the science process skills is defined in this study as a set of skills used in conceptual tasks. Enrolled science process skills students are effectively involved in the learning process. Students will benefit from opportunities to be successfully included in learning if the learning organisation is structured in this method.

2. Basic Science Process Skills

These terms, which are identified as observing, communicating, classifying, measuring, inferring, and experiencing, are sequenced and evolved from Piaget's work around formative brain research and allude to the basic skills required to produce logical data, conduct practical investigations, and solve problems (Veronique, 2017). In this study, the basic science process skills was defined as the abilities of observing, communicating, classifying, measuring, inferring and predicting in chemistry science.

3. Integrated Science Process Skills

Rambuda and Fraser (2004) define integrated science process skills as "immediate abilities used in problem-solving or performing science tests" (Richard, Francis, 2013). In this study, integrated science process skills were identified as learners being asked to combine basic science process skills for greater mastery and adaptability in planning the instruments they use when thinking about or exploring

phenomena, as the term coordinates implies. The integrated skills incorporate controlling variables, defining operation, formulating hypotheses, interpreting data, experimenting, and formulating models.

4. Inquiry

Inquiry refers to the teaching and learning methods that enable students to master concepts through assessment and practical application (National Research Council [NRC], 2000). This research question refers to the skills that students may develop in order to devise and conduct scientific experiments.

5. Open Inquiry

Open or "total" inquiry can be defined as an approach that begins at the address of a student, after which the students plan and perform an exam or test and communicate the result (National Investigate Committee, 1996; Colburn, 2000). In this study, the emphasis is on the method of searching for and discovering information through the method of examination of an issue, in which the students' needs look for and uncover their own piece of information, while the professors act as facilitators and guides for the understudies to develop appropriateness, pose difficult questions, and initiate lecturer assessment in learning.

6. 5E Model

The 5E model can be used to plan an academic course and is based on psychology, the hypothesis of constructivist-learning and the best science educator (Bybee and Landes, 1990; Lena and Emilio, 2004). 5Es are defined as a guide model in this study that encompasses the phases engagement, exploration, explanation, elaboration and evaluation, which teachers usually instructed students to follow in stages.

7. Molarity

Molarity is a chemistry subject, that offered in chemistry books usually in secondary schools world-wide, and it can be defined as, the number of moles of solute

per litter of solution (Nicole, 2020). In this study Molarity is defined as the molar concentration of a solution.

8. Module

The module could provide student guidance through the substance and evaluations, within the arrangements indicated by the educators, in a coherent and consecutive way. Education can include organised content, records, web links, speech topics, assignments, tests and tests as well as evaluations in advance (Toohey 1999; Moon, 2002).

1.10 Summary

This chapter of the study aims to identify the purpose of the study. This study is describing the science process skills mentioning its components (Basic and Integrated SPS) and aims to develop and use SPS in teaching and learning, especially chemistry subjects such as Molarity and enhance the learning procedure by entering the open inquiry to the model of teaching and learning.

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