

# Development of the Self-Directed E-Learning Module on Introduction C++ Programming Language for Undergraduate Students in Faculty of Sciences and Technology at Mean Chey University (EAP)

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**Abstract**— The objectives of this research were 1) to identify the efficiency of the self-directed E-learning module on introduction C++ programming language for undergraduate Students in Faculty of Sciences and Technology at Mean Chey University, 2) to compare the students' learning achievement before and after using the module, and 3) to study the students' satisfaction towards using the module.

The sample group of this research was consisted of 30 first year students who studied in Faculty of Sciences and Technology at Mean Chey University in academic year 2017. The research instruments included the self-directed E-learning module on introduction C++ programming language for undergraduate Students in Faculty of Sciences and Technology at Mean Chey University, a pre-test and a post-test on introduction C++ programming language, and students' satisfaction questionnaires towards the module. The data were analyzed using percentage, mean, standard deviation and dependent t-test.

The research revealed that the self-directed E-learning module on introduction C++ programming language for undergraduate Students in Faculty of Sciences and Technology at Mean Chey University had passed the standard criterion with an efficiency level of 82.67/80.53. Furthermore, the students' learning achievement after using the module was higher than before using the module. The students' pre-test scores was  $\bar{x}=12.40$ ,  $SD=0.87$ ; and their post-test score was  $\bar{x}=12.08$ ,  $SD=1.15$ . The t-test score between pre-test and post-test was 1.78. There was a significant difference between pre-test and post-test scores at the .05 level of significant. Moreover, the students' satisfaction towards the module was at a high level with the mean score of 3.91.

**Keywords**—E-learning, undergraduate students, C++ programming language, self-directed learning.

## I. INTRODUCTION

Learning is one of the very vital human activities that require concentration blended with interactivity, clear and distinct understanding of the facts been stated or discussed, high communication skills and techniques, attractive learning qualities such as colorful pictorial presentations of information among others. Nevertheless, all not learning process is considered to be effective.

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For effective learning to take place, it is dependent on many factors. In most cases, these factors arise from the teachers, the students, the teaching and learning media or materials, and the learning environment with its structures. For instance, if a teacher lacks communication skills and techniques, the students, will find it difficult to comprehend, if the necessary media or materials required for teaching and learning is not provided or if the provision is inadequate, the understanding of the subject topic or issue been discussed might be impaired. Most especially, the factors affecting effective learning is pronounced in learning aspects where intensive or much practical approach is required for the impacting of knowledge to the students. For example, in computer science much practical knowledge is required especially in computer networking, computer programming, and computer maintenance.

Accessing of the e-learning materials and following the animated instructions contained therein. Finally, the case study computer science department, federal polytechnic needed, Owerri is selected due to its proximity.

### A. Purpose of the Study

Owing to the difficulties experienced during teaching and learning processes, this project is aimed at implementing e-learning through the development of a web site expected to be published over the internet. This web-based e-learning module is to provide different remedy platforms for the shortcoming found in the traditional teaching and learning procedures.

Focusing on the above, the objectives of the study are to develop e-learning applications that are capable of:

1. providing coherent instruction for the selected subject topics
2. Accommodating individual learning style.
3. Encouraging learning and mastering of the individual topic contained therein.
4. Enhancing the students' practical knowledge and broaden their theoretical knowledge.
5. Creating a more interacting learning process.
6. Overcoming most factors affecting effecting learning such as noise.
7. Promoting students' focus during learning.
8. Accommodation learner's unrestricted learning schedule.
9. Promoting quick access of information.

10. Providing accurate and high-quality content value

*B. Scope of the study*

The proposed e-learning products are targeted for the attainment of effective learning through the use of interactive presentations. Further, the products are expected to be used by computer science students with little or no pre-knowledge of C++ programming language. The product contents are structured to accommodate novice in computer programming and their usage are not limited to computer science students alone but to students of other disciplines who wish to have basic fundamental knowledge on programming using programming language.

Response to Certain Factors Affecting Effective Learning- E-learning Versus Traditional Teaching and Learning

FACTORS	E-LEARNING	TRADITIONAL TEACHING
Learning duration	Flexible	Rigid
Learning style	Accommodates the individual learning style	Does not accommodate individual learning style
Temperature	Moderately affect	Heavily affected
Ventilation	May or may not affect	Often affected if the Population size is high
Noise	Present but can be controlled and reduced through the use of device such as headset.	Present and often time prove to be difficult to control
Learning infrastructure	Not very important	Very important
Learning Materials and media	Required	Required
Communication technique	Often high	Occasionally high
Rate of assimilation	Varies comparative but often high	Varies comparative but often low
State of mind	Affected	Affected
Repetitive	Allows repetitive learning	Does not allow repetitive learning
Learning Information Representation	High quality information representation	Sometime, information representation is of poor quality

*C. Benefits of Programming Language C++*

- Because C++ is an object-oriented programming language, it is designed to allow the creation and manipulation of objects from the problem domain. Thus, C++ allows e-learners to operate at a higher level of abstraction. This higher level of abstraction allows programmers and e-learners to develop software in the language of the problem domain rather than in the language of the computer. A good abstraction allows users to use an object in a relatively safe and predictable manner. It reduces the learning curve by providing a simple interface described in terms of the users' own vocabulary.
- C++ is a multiparadigm language. This allows developers and e-learners to choose the programming style that is right for the task at hand. For example, a traditional procedural style may be appropriate for performing a

simple task such as writing the code within a small member function.

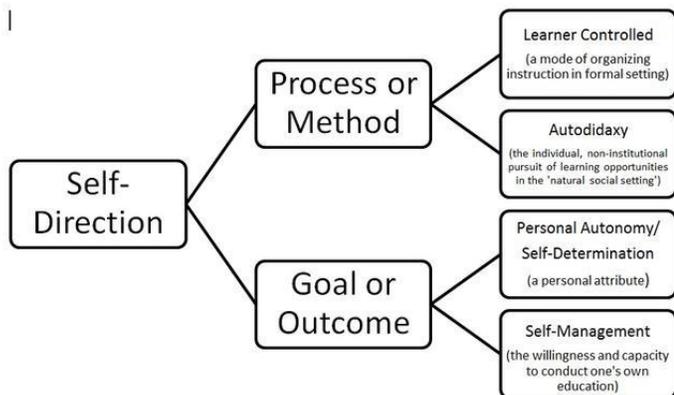
- C++ software can be performance and memories efficient, for example, well-designed object-oriented software is normally comprehensible and therefore amenable to performance tuning. In addition, C++ program has low-level facilities that allow a skilled C++ developer and learners to obtain appropriate levels of performance.
- C++ program is backward compatible with C. this is useful in very large legacy systems where the migration to C++ program normally occurs a few subsystems at a time rather than all at once. In particular, C++ backward compatibility makes it relatively inexpensive to compile C code with C++ compiler.
- C++ is a huge language with a very board base of users. This large user community has led to high quality compiler and other development tools for a wide range of systems.
- C++ is the programming language of choice for the software industry. A few careers that may be advanced by knowledge of C++ include computer programmers, software engineers, e-learners, web developers and game designers learn program with C++ online without attending classes.
- C++ is one of the most popular programming language and its application domain includes system software (such as Microsoft windows) application software, device drivers, embedded software, high-performance server and client applications and entertainment software such as video games. Several groups provide both free and proprietary
- C++ compiler software, including the GNU project, Microsoft, Intel and Embarcadero technologies. C++ has greatly influenced many other popular programming languages, most notable C and java.
- C++ is also used for hardware design where the design is initially described in C++, then analyzed, architecturally constrained, and scheduled to create a register-transfer level hardware description language via high-level synthesis. The language began as enhancement to C, first adding classes, then virtual functions, operator overloading, multiple inheritance, templates, and exception handing among other features

II. PROGRAM STRUCTURE

To discuss the program structure, there is the need to recall that the proposed e-learning products are of three independents but the same subject scope products and as such, there program structure differs from one another. The web based tutorial is developed using the top-down program design. The index page is the first to be designed and the highest in level ranking. Most of the web pages are directly under it; nevertheless, not all of them that are directly under it are directly accessible through it. For instance, the feedback page is directly under it but is not directly accessible from it. For instance, the password module is designed to give preference to the premium user such as unlimited access to product content and changing of user

password. Also, some of the modules are global while some are local. The global modules such the password dialogue box within the main application window could be called at any time during program execution while the local modules are restricted to their domain. Figures 8a, 8b, 9a, and 9b in the Appendix show the user interface of the password within the main window, its source, code the user interface of the products chapter one, and its source code respectively. Lastly, the e-book program structure is relatively top-down program design. It also made use of hyperlink to interlink the terms contained in there and the table of content to the detail discussion of the subjects.

### III. SELF-DIRECTED LEARNING



#### Students' roles

- Self-assess your readiness to learn
- Define your learning goals and develop a learning contract
- Monitor your learning process
- Take initiative for all stages of the learning process — be self-motivated
- Re-evaluate and alter goals as required during your unit of study
- Consult with your advising instructor as required

#### Advising instructors' roles

- Build a co-operative learning environment
- Help to motivate and direct the students' learning experience
- Facilitate students' initiatives for learning
- Be available for consultations as appropriate during the learning process
- Serve as an advisor rather than a formal instructor

### IV. RESEARCH METHODOLOGY

Research on the development of the Self-Directed E-Learning Module on Introduction C++ Programming Language for Undergraduate Students The purpose is to develop e-learning for self-learning, to compare achievement between and after learning of students with e-learning materials for self-learning issues, to study the satisfaction of undergraduate students studying e- learning for self-learning. C ++ preliminary study was conducted by the following procedures.

#### 1. Experimental Design

Experimental design the researcher conducted one - group pretest - Posttest Design

#### 2. Population and sample

Population used for this research is a group of undergraduate students of 30 in numbers studying in faculty of Science and Information Technology at Mean Chey University in Cambodia

#### 3. Duration of Research

Semester 2, Year 2017

#### 4. Creating and Finding Quality Educational Tools

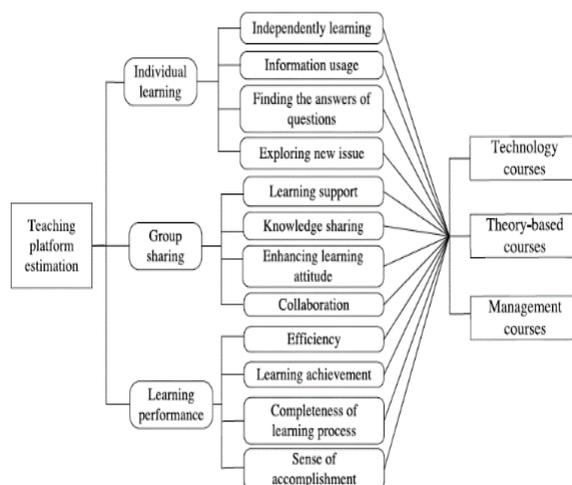
#### 5. Creating a Creative Training Package

#### 6. The process of finding the effectiveness of web-based teaching

#### 7. Creating Quizzes

#### 8. Data collection

### V. EVALUATION OF A WEB-BASED E-LEARNING PLATFORM



A web-based E-Learning course is the confluence of teaching contents and activities of some subject [4]. The teaching contents and activities are presented by network. So a web-based E-Learning course can be divided into two parts: teaching contents and web learning and teaching environment organized by teaching objectives and strategies [5]. Teaching contents of web-based E-Learning course can be presented by web page, teaching activities can be realized by BBS, online test and so on. Aiming at the two parts of web-based E-Learning course, the platform provides function modules of teaching activities and teaching contents (have interface of editing contents). Through some simple operations of teacher, the diverse function modules of teaching activities and teaching contents have been edited can be composed to a web-based E-Learning course of systematization and independence. As the platform adopted B/S (browser/server) mode, the clients need not to install any software, after logging in the platform through browser, teachers can develop courses online. The platform emphasizes easy and humanistic operation and functions available for selection among diverse modules and within one

module. Because the platform provides instructional strategies templates, under the guidance of the platform, teachers who aren't familiar with teaching philosophy can design and develop web-based E-Learning courses in accordance with characters of students and subject and teaching regulations of E-Learning.

## VI. CONCLUSION

Research indicates that Achievement after learning that lesson by teaching through the medium of e-learning for self-learning C ++ a prerequisite for students. In the test, the average score of students. 12.40 With a standard deviation (S. D.) Equivalent 0.87 after students Learn from coaching through e-learning for learning C ++ introduction. After the student's test, the average score was higher than the average score. 12.08 With a standard deviation (S. D.) Equivalent 1.15 Analysis t-test between and after learning more. 1.78 The difference was statistically significant at the level of 0.05.

Results from the study were analyzed. Student Satisfaction Level After using e- learning for learning with the development of self-directed E-Learning was high with an average of 3.91. Because of the lessons learned activity, the students were satisfied with the teaching media. It also helps to recognize and act as a step. This is because the learners are learning the content they need. The results show the progress of learning periodically. Make the students interested, and once the learner reaches a certain level, he or she will gain instant success.

Note that during learning and teaching through the media of e-learning for learning C ++ for students Undergraduate of the University of Cambodia, students are willing and enthusiastic to learn and enjoy. Confidence in using variables, operators, arrays, control commands, data structures, pointers, and so on. From the media to the learning, they also have the exchange of

learning each other. The students have developed the potential. The teacher plans to cooperate with the students.

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