**CHAPTER ONE**

**INTRODUCTION**

* 1. **BACKGROUND INFORMATION**

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.

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. In addition, the duration for teaching and learning, the rate of understanding and individual learning style effect the assimilation of knowledge by the students; and may have impact on the extent to which the teacher covers the teaching scheme. These factors will, certainly, hamper the effective teaching and learning by the teacher and by the students respectively.

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. The practical equipping of students are been affected by certain factors such as the duration for practical teaching and learning, inadequate computers, availability of computer laboratories, and poor power supply among others.

As a result it is generally observed that most computer science students with little or no practical knowledge engages the service of the road side “computer training institute” due to the fact that it is not financially intensive and there is great need for the services, this approach, by such student has high tendency of impacting wrong knowledge on students especially on the terms and explanation of concept s found or used in the computer science world. Therefore, there is the need to reduce this different situation and ensure that the practical standard required of the students is attained.

The progress made in the computer world through the development of sophisticated hardware, software, and other technologies could be employed for the remedy of the situation. Exploring the powerful capabilities of multimedia and implementing it on teaching and learning processes via the production of learning material and products such as e-book, computer assisted learning (CAI), computer aided instruction(CAT), computer based training(CBT), internet based training among others would go a long way towards improving the advancement of the practical and theoretical knowledge of the students. With high quality content value of the e-learning products and the captivating multimedia features embedded in them, a student can easily, assimilate such knowledge (even in the absence of a teacher and the required physical environment) through repetitive

Accessing of the e-learning materials and following the animated instructions contained therein. Finally, the case study computer science department, Joseph Ayo Babalola University is selected due to its proximity.

**1.2 STATEMENT OF THE PROBLEM**

It is very obvious that it is required of the computer science students to be practically and theoretically sound so as to face the challenges to be encountered in the labor market. Disappointingly, most of the computer science students are not equipped as expected before lunching them into the labor market.

Often time, the students are found to be the highest set of customers patronizing most of the side “computer training institute” and in turn, might not get the value of services they requested. This situation had been ascribed to many claims, for instance, the students claim the greater percentage of the teachers have poor teaching communication skills, and likewise the teachers blame the inadequate teaching and learning facilities and/ or infrastructure as the reason for ineffective learning.

Hence, the problem centers on effective teaching and learning processes for the impacting and the advancement of the students’ theoretical and practical knowledge.

**1.3 OBJECTIVES OF THE STUDY**

Owing to the difficulties experienced during teaching and learning processes, this project will be aimed at implementing e-learning through the development of a web site expected to be published over the internet, a CAL application package that will be installed in a computer, and an e-book in portal document format (PDF); this 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 student’s 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 student’s concentration during learning.
8. Accommodation learner’s unrestricted learning schedule.
9. Promoting quick assimilation of information.
10. Providing accurate and high-quality content value.

**1.4 METHODOLOGY**

**a) The Input Variables**

The input variables that will be selected will be those which can easily be obtained from students in the university.

**b) Plan**

The programming language that will be used for developing the E-learning platform will be HTML. The HTML codes will be written using a program editor such as Notepad but this will cost me more time. Considering the time constraint, I resolve to use a fourth-generation program development application package. The fourth-generation program development application package that will be used for the development of the E-learning platform is the Microsoft front page. The CAL will be developed using the object-oriented program development application package so as to achieve the goal of compatibility. There are many application packages that fall in the same category of the aforementioned development application package such as OOPascal [Delphi] visual base, and OOFortian.

**CHAPTER TWO**

**LITERATURE REVIEW**

**2.1 INTRODUCTION**

This chapter of this project seminar presentation attempts to consider the various opinions of some scholars and practitioners as regards to the development and implementation of e-learning in the educational sector. It considers the challenges faced by the traditional teaching and learning procedure and how to use e-learning procedure as a supportive approach to traditional teaching and learning procedure in the acquisition of knowledge and skills. It also reviews the factors affecting effective implementation of e-learning especially in the under developed and the developing countries. Finally, it suggested various ways through which the intending factors to the efficient e-learning procedure could be overcome.

**2.2 THE TRADITIONAL TEACHING AND LEARNING PROCEDURE AND SOME OF ITS WEAKNESS**

The traditional teaching and learning procedure which is based upon “physical contact” and emphases face-to-face teaching and learning adoption, had been the predominant method of impacting knowledge and skills acquisition to the students especially in the under developed and developed countries. This kind of teaching and learning procedure demands the physical presence of the teacher and the students. it is conducted within a defined physical location such as classroom or lecture halls at a definite time duration. Its communication is carried out through the use of interactive white or chalkboard with markers or chalks respectively and in addition demands high communication skills such as constructive languages and simple statements accompanied by the cordial relationship between the students and the teachers. Though the traditional teaching and learning procedure had proven to be greatly indispensible, for the impacting of knowledge and skills of their tutor, the location, and environment where the teaching and learning activities are carried out. this in most cases increases the chance of the students to be narrowly developed and sometimes becomes capitally intensives for the students who tend to increase their knowledge and skills from another physical location. Most campus-based institutions have school libraries which helps them to solidity their traditional teaching and learning procedure, but often time the library infrastructures are deteriorated and the library books are far outdated, posing challenges to the acquisition and access to recent information. This is also present in the traditional libraries which are not owned by the campus-based institutions. Interaction among peers or students in the same field of study and among individuals of different levels of knowledge and skills can boost knowledge and skills acquisition, but this is principally affected by the physical location and the financial involvement for such an interaction especially when the interaction or forum is formally organized.

The efficiency of traditional teaching and learning is also affected by the time constraint. Farmer (2004) noted that traditional learning exists in real time in one location; this is not a problem for the campus-based students rather a problem to distant students and part-time working students. Then flexibility of time and the fixed location nature of the traditional teaching and learning procedure had, in many occasions, affected the education acquisition zeal of most students who carry other responsibilities together with their education. The traditional teaching and learning procedure do not encourage distance education (as in the case of cross country educational and is often affected by the economy, the political state and the natural condition (such as precipitation) of the location or region where the activity is conducted; thus, making the acquisition of knowledge and skills expensive in time and other resources.

In the view of these challenges, there is a great need for the adoption of a teaching and learning procedure which will complement the shortcomings that is evident in the traditional teaching and learning procedure.

**2.3 WHAT IS E-LEARNING? /THE E-LEARNING PROCEDURE**

The term e-learning, due to the ever changing nature of its constituents, had been defined by many scholars in many diverse ways. For instance, Hedge and Hayward(2004) states that e-learning is an innovative approach for delivering electronically mediated, well-design, learner- centered and interactive learning environments to anyone, anyplace, anytime by utilizing the internet and digital technologies in concern with instructional design principles. In their definition they emphasized the use of the internet, which now predominate the e-learning society, as the principle medium for conducting e-learning activities. Another scholar explains that it involves the use of electronic technology in the delivering of education and training applications, monitoring of e-learners performance and reporting of learner’s progress (sale 2002; Ajadi et al, 2008). This definition is in accordance with the definition of Wikipedia online encyclopedia which that it is any learning activity which is carried out using digital technology. However, the predominant features of e-learning with respect to its explanation or definition are the involvement of electronic devices (such as computer) and digital technologies (such as ICT).

In addition, e-learning had undergone a number of distinct phases which include the following: electronic book (e-book), computer Based Training (CBT), Computer Assisted learning (CAL), Computer Assisted Instruction (CAI), Courseware management systems, (CMS), Learning management systems (LMS) or managed learning environment (MLE), Internet Based learning and mobile learning (M-learning).Each of these phases is designed to deliver knowledge and skills using a specific electronic technology, learning structure and/or electronic retrieval system/media. Most of the e-learning products are available on CD-ROM or DVD-ROM plates with the exception of the online e-learning tutorials, internet based learning and mobile learning products; thus, making learning flexible and mobile.

The e-learning procedure rarely demand for the physical presence of the teacher and the students before teaching and learning activities can take place. It is not tied to a specific location and time frame. Ajadi et al (2008) affirms that the adoption of e-learning in education (specifically, in the national open university of Nigeria) is favorable to the students who are mostly works. Apart from this, e-learning procedure increases in the e-learning opportunities of the students at their own convenient time and place. it is also promotes individualized learning, makes available a greater variety of learning materials on current issues, and promotes the access to learning oriented forum. Shavinina stresses that today’s e-learning products are domain-specific. In domain- specific products, knowledge acquisition and skills development are the paramount objectives. The OECD/CERI in a research work on e-learning states the following;

The “learning object” model is perhaps the most prominent “revolutionary” approach to date. A learning object can be described as an electronic tool/resource that can be used, re-used and redesigned in different contexts, for different purposes and by different academics/actors.

According to khoo, a recent study on the effectiveness of e-learning use in teacher training conducted on sixty-six trainee teachers by lou C.T of the National institute of Education, Singapore, revealed that there is significant gain in learning for trainee teachers after using the retyped e-learning product. This implies that students who are exposed to learning using e-learning products are likely to make significant gain. Figure 2 in the appendix depicts the break of the teacher’s monopoly role of holding onto the knowledge base and delivering the knowledge to the manager of the learning process and a true facilitator. Furthermore, the e-learning procedure is not affected by natural factors such as precipitation or by need of physical immobile structures or infrastructure such as lecture hall since they cannot prevent the learner from learning and their deterioration have little or no impact on the learning activities respectively. Obviously, the cost incurred in traditional teaching and learning procedure due to traveling, accommodation, and other related cost are absent in the e-learning procedure.

Although with the e-learning procedure, the shortcoming of the traditional teaching and learning procedure would be reduced; some scholars had maintained the fact that it cannot display the traditional teaching and learning procedure in the educational sector. Dr. Farmer (2004) makes the following comment about e-learning.

Furthermore, learning can extend beyond classrooms because of technology. It should be noted that virtual interaction (e.g., second life) does not replace face- to-face interaction because the former is an artificial environment; therefore, it is important to figure out how to blend physical and digital world.

Considering the impact of technology ICT in particular) and is wide spreading implementation in electronic devices, t is now possible to conduct face-to-face e-learning activities, nevertheless, the cost of its implementation (especially, in the under-developed countries) limits its adoption by so many educational institutions. Khoo, and Aduwa-ogiegbaen and iyawu (2005) in their respective perspective suggest that e-learning and its facilitator- ICT- should be used for optimizing teaching, training, and learning.

**2.4 CHALLENGES AFFECTING THE EFFECTIVE IMPLEMENTATION OF E-LEARNING**

The prospects for effective implementation of e-learning in the educational sector it’s challenged by the absence or inadequacy of certain resources. Most of these challenges are prominent in the under-developed and developed countries. They are as follows:

1. **poverty level and cost of implementation**

Due to the high poverty rate in the under-developed and developed countries, the cost of procuring computer embedded components and other facilities necessary for conducting e-learning is expensive. Average employees require more than two years income to get at least a desktop personal computer and similarly, t would be different, if not possible, for a student from a poor family to own a computer. This stands as a challenge even when there are claims of global price fall in computer hardware.

E-learning applications vary in scale and purpose and encompass a full range of engagement points, nevertheless, some scholars see it to be cost intensive. Curtain (2002) expresses that an online multimedia-dependent course is likely to be 200% to 500% more expensive than text-only course and the time involved in creating heavily enriched multimedia courses has been found to be five to ten times greater than for developing text-only courses. Additional costs, according to moonen, are attributed to the increase in time it takes to develop, produce, deliver and maintain e-learning products and services. However, the general increase in its cost is due to the demand for more sophisticated e-learning producers such as face-to-face online interaction e-learning product.

Another cost challenge arises from software and license cost. Ajadi et al (2008) explained that most of the software products required for e-learning activities are not locally developed and as such, they are mostly designed to suit the system where they are developed thereby making them rather very expensive. Kahn (2002) added that the one-time price to buy software, designers and developers must also purchase an individual licensing free, pay for each additional user and pay for upgrades which are available for most software on a semi-frequent basis. It is clear that there is a great discrepancy between relevant software supply, demand in developing countries and individual user satisfaction.

1. **Infrastructural challenges**

The most pronounced of them is the insufficiency of ICT facilities. The leading ICT components which are telecommunication and the internet are unevenly distributed. Most of the minor towns in the state of the under-developed and developed countries do not have access to either telecommunication facilities or the internet; this is as a result, would not allow the implementation of e-learning in such area.

Although the number of ISP is at increase, the still render poor services to their customers and are often exploitative. This affects the use of heavy e-learning products such as multimedia. Furthermore, the challenge encountered in the use of heavy e-learning products over the internet stems from the bandwidth and the mode of transmission in use. For instance, the amount of information that can be sent over an analog telephone line is limited by the bandwidth of the transmission.

Most educational institution have inadequate ICT facilities to lunch e-learning such as library while some have such facilities deteriorated due to poor management and maintenance. This difficulty had always been ascribed to inadequate funding and insufficient IT staffs to maintain and recommend they required ICT facilities.

Most students rely on the use of the cyber café for their e-learning activities; nevertheless, population of customers present in a cyber café and the kind of internet activities they engage in may hamper the effective use of the e-learning product by the student.

1. **Inadequate ICT knowledge and skills**

This is evident in the barrier to the effective use of e-learning in education and it often exists among the students and the teachers. Though there is significant increase in the population of students and teachers with ICT knowledge and skills, the population without such knowledge still predominates. The OECD/CERI research reveals that the intensity of online learning varies greatly across disciplines with IT and business/management emerging as the most common cited disciplines that makes significant use of some form of e-learning. This, therefore, makes us to understand the reason for which is greater population of students and teachers without ICT knowledge and skills especially in the non-technology and-business tertiary institutions.

1. **Mode of products and services**

Most of the e-learning products and services offered by schools and individuals require the user to either purchase the product or subscribe for the service. Often times the cost of such product or service is very expensive and hence, limits its usage.

It is obvious that most educational institutions and even educational governing bodies are embracing ICT in their respective educational activities. Contrary to the primary objectives of using ICT to promote education, teaching and learning, the impact is more on administrative services such as admissions, registration, fee payment and purchasing.

**2.5 POSSIBLE REMEDIES TO THE AFOREMENTIONED CHALLENGES AFFECTING THE EFFECTIVE IMPLEMENTATION OF E-LEARNING**

I. Reduction in the cost of implementation

Although the cost of implementation for e-learning is driven by so many factors especially poverty rate, cost of production and adaptability, certain policies and alleviation programs could be adopted so as to reduce its cost of implementation. For instance, the government could encourage the importation and acquisition of ICT facilities by removing their import duties. Also, organizing promo programs that would encourage the purchase of computer and the related e-learning requirements on certain payment arrangement such as credit purchase might still reduce the cost of implementation.

ii. Training and Development of Man-power

For the effective use and sustainability of e-learning, there is great need for the training and development of man-power in ICT knowledge and skills. The knowledge and skills required should not be limited to the use of already made e-learning products but must include the knowledge and skills required for the development and production of e-learning that are adaptable with our educational system and curriculum. In addition, the recruitment of a broader range of staff to complement academic staff such as technologist, instructional designers, and learning scientists should be encouraged.

iii Adequacy of the require infrastructure and Improved Service Delivery

There is the need to make adequate provisions for the necessary infrastructure that directly affect the efficiency of e-learning such as ICT facilities and the ones that indirectly affect its efficiency such as electricity, and also to make them to be evenly distributed. Also, there is for collaborative effort towards promoting the quality of the service rendered to the customers by the ISP and making the service less exploitative.

Iv. Adoption of Free Product and Services

Despite the fact that money is the optimum reason for every service that is rendered, it is important to incorporate free e-learning products and services so as to promote its usage. As regards to this, there is the need for individuals, corporate bodies, educational institutions and educational governing bodies to embark on rendering free e-learning services and products. Furthermore, educational institutions and educational governing bodies should increase the use of ICT more for learning and teaching rather than on administrative purposes.

1. Government Policy and Involvement

Government plays important role in most of the innovative and development at activities; similarly, majority of these challenges impending the efficient use of e-learning could be reduced through certain government policies and involvement. Legal contexts could be adopted by the government in order to foster the further development of e-learning. Apart from the use of legal contexts, OECD/CERI research paper suggests that government could equally be involved in the following:

1. Encourage the dissemination of good (and lessons from the bad) practices to stimulate innovation, and scale up successful experiments.
2. Encourage appropriate staff development, collective as well as individual, in order to ensure progress at institutional level.
3. Support research and development on e-learning objects and other promising pedagogic innovations.
4. Against the background of uncertainty about best practices, explore the issue surrounding intellectual pr-operty in e-learning.
5. Promote a dialogue between IT providers and institutions, and support public private partnership, in order to keep costs at a reasonable level.

**2.6 CONCEPT OF COMPUTER PROGRAMMING**

A computer is a machine that receives instructions and produces a result after performing an appropriate assignment. Since is a machine, it expects good and precise directives in order to do something.

The end result depends on various factors ranging from the particular capacities of the machine, the instruction it received, and computer cannot figure out what you want. The computer doesn’t think and therefore doesn’t make mistakes.

Computer programming is the art of writing instructions (programs) that ask the computer to do something and give a result. A computer receives instructions in many different forms, four of which are particularly important. The first instruction are given by the manufacturers of various hardware parts such as the microprocessor, the mother board, the floppy and CD-ROM drives, etc. these parts are usually made by different companies, setting different and various goals that their particular part can perform. The instruction given to the microprocessor, for example, tells it how to perform calculations, at what speed, and under which circumstances.

The instruction given to the motherboard tell it to behave like a city where people and cars can move from one part of the town to another, back and forth, for various reasons; this allows information to flow from one part of the city, I mean one section of the computer to another.

Once the instructions given to the hardware parts are known, software engineers use that information to give the second sets of instructions to the computer. These instructions known as an operating system are usually written by one company.

These second instructions tell the computer how to coordinate its different components so the result will be a combination of different effects.

This time, the computer is instructed about where the pieces of information it receives are coming from, what to do with them, and then where to send the result. This time also the operating system designers impose a lot of behaviors to the computer as a machine.

**2.7 HOW TO LEARN PYTHON (STEP-BY-STEP) IN 2021**

Python is an important programming language to know — it's widely-used in fields like data science, web development, software engineering, game development, automation. But what's the best way to learn Python? That can be difficult and painful to figure out. I know that from experience. One of the things that I found most frustrating when I was learning Python was how generic all the learning resources were. I wanted to learn how to make websites using Python, but it seemed like every learning resource wanted me to spend two long, boring, months on Python syntax before I could even think about doing what interested me.

This mismatch made learning Python quite intimidating for me. I put it off for months. I got a couple of lessons into the [Codecademy](https://www.codecademy.com/" \t "_blank) tutorials, then stopped. I looked at Python code, but it was foreign and confusing. Paruchuri (2021)

But even a few seemingly simple lines of code can be incredibly confusing. For instance, why are some lines indented? What’s django.http? Why are some things in parentheses?

Understanding how everything fits together when you don’t know much Python can be very hard.

The problem is that you need to understand the building blocks of the Python language to build anything interesting. The above code snippet creates a view, which is one of the key building blocks of a website using the popular **[MVC](https://en.wikipedia.org/wiki/Model%E2%80%93view%E2%80%93controller" \t "_blank)** architecture. If you don’t know how to write the code to create a view, it isn’t really possible to make a dynamic website.

Most tutorials assume that you need to learn all of Python syntax before you can start doing anything interesting. This is what leads to months spent just on syntax, when what you really want to be doing is analyzing data, or building a website, or creating an autonomous drone.

All that time spent on syntax rather than what you want to be doing causes your motivation to ebb away, and to you just calling the whole thing off.

I like to think of this as **the “cliff of boring”**. You need to be able to climb the “cliff of boring” to make it to the “la0nd of interesting stuff you work on” (better name pending).

But you **don't** have to spend months on that cliff.

**Step 1: Figure Out What Motivates You to Learn Python?**

Before you start diving into learning Python online, it’s worth asking yourself why you want to learn it. This is because it’s going to be a long and sometimes painful journey. Without enough motivation, you probably won’t make it through. For example, I slept through high school and college programming classes when I had to memorize syntax and I wasn’t motivated. On the other hand, when I needed to use Python to build a website to automatically score essays, I stayed up nights to finish it.

Figuring out what motivates you will help you figure out an end goal, and a path that gets you there without boredom. You don’t have to figure out an exact project, just a general area you’re interested in as you prepare to learn Python.

Pick an area you’re interested in, such as:

* Data science / Machine learning
* Mobile apps
* Websites
* Games
* Data processing and analysis
* Hardware / Sensors / Robots
* Scripts to automate your work

## Step 2: Learn the Basic Syntax

Unfortunately, this step can’t be skipped. You have to learn the very basics of Python syntax before you dive deeper into your chosen area. You want to spend the minimum amount of time on this, as it isn’t very motivating.

Here are some good resources to help you learn the basics:

* [Learn Python the Hard Way](https://learnpythonthehardway.org/" \t "_blank) — a book that teaches Python concepts from the basics to more in-depth programs.
* [Dataquest – Python for Data Science Fundamentals Course](https://www.dataquest.io/course/python-for-data-science-fundamentals/) — I started Dataquest to make learning Python and data science easier. Dataquest teaches Python syntax in the context of learning data science. For example, you’ll learn about for loops while analyzing weather data.
* [The Python Tutorial](https://docs.python.org/3/tutorial/" \t "_blank) — the tutorial on the main Python site.

I can’t emphasize enough that you should only spend the minimum amount of time possible on basic syntax. The quicker you can get to working on projects, the faster you will learn. You can always refer back to the syntax when you get stuck later. You should ideally only spend a couple of weeks on this phase, and definitely no more than a month.

Also, a quick note: learn Python 3, not Python 2. Unfortunately a lot of "learn Python" resources online still teach Python 2, but [you should definitely learn Python 3](https://www.dataquest.io/blog/python-2-or-3/" \t "_blank). Python 2 is [no longer supported](https://www.python.org/doc/sunset-python-2/" \t "_blank), so bugs and security holes will not be fixed!

## Step 3: Make Structured Projects

Once you’ve learned the basic syntax, it’s possible to start making projects on your own. Projects are a great way to learn, because they let you apply your knowledge. Unless you apply your knowledge, it will be hard to retain it. Projects will push your capabilities, help you learn new things, and help you build a portfolio to show to potential employers.

However, very freeform projects at this point will be painful — you’ll get stuck a lot, and need to refer to documentation. Because of this, it’s usually better to make more structured projects until you feel comfortable enough to make projects completely on your own. Many learning resources offer structured projects, and these projects let you build interesting things in the areas you care about while still preventing you from getting stuck.

Let’s look at some good resources for structured projects in each area:

### Data science / Machine learning

* [Dataquest](https://www.dataquest.io/) — Teaches you Python and data science interactively. You analyze a series of interesting datasets ranging from CIA documents to NBA player stats. You eventually build complex algorithms, including neural networks and decision trees.
* [Python for Data Analysis](https://shop.oreilly.com/product/0636920023784.do" \t "_blank) — written by the author of a major Python data analysis library, it’s a good introduction to analyzing data in Python.
* [Scikit-learn documentation](https://scikit-learn.org/stable/documentation.html" \t "_blank) — Scikit-learn is the main Python machine learning library. It has some great documentation and tutorials.
* [CS109](https://cs109.github.io/2015/" \t "_blank) — this is a Harvard class that teaches Python for data science. They have some of their [projects and other materials](https://github.com/cs109/content" \t "_blank) online.

### Mobile Apps

* [Kivy guide](https://kivy.org/docs/gettingstarted/intro.html" \t "_blank) — Kivy is a tool that lets you make mobile apps with Python. They have a guide on how to get started.

### Websites

* [Flask tutorial](https://flask.pocoo.org/docs/1.0" \t "_blank) — Flask is a popular web framework for Python. This is the introductory tutorial.
* [Bottle tutorial](https://bottlepy.org/docs/dev/tutorial_app.html" \t "_blank) — Bottle is another web framework for Python. This is how to get started with it.
* [How To Tango With Django](https://www.tangowithdjango.com/" \t "_blank) — A guide to using Django, a complex Python web framework.

### Games

* [Codecademy](https://www.codecademy.com/" \t "_blank) — walks you through making a couple of simple games.
* [Pygame tutorials](https://www.pygame.org/wiki/tutorials" \t "_blank) — Pygame is a popular Python library for making games, and this is a list of tutorials for it.
* [Making games with Pygame](https://www.amazon.com/Making-Games-Python-Pygame-Sweigart/dp/1469901730" \t "_blank) — A book that teaches you how to make games in Python.
* [Invent your own computer games with Python](https://www.amazon.com/gp/product/1503212300" \t "_blank) — a book that walks you through how to make several games using Python.

## Step 4: Work on Python Projects on Your Own

Once you’ve completed some structured projects, it’s time to work on projects on your own to continue to learn Python better. You’ll still be consulting resources and learning concepts, but you’ll be working on what you want to work on. Before you dive into working on your own projects, you should feel comfortable debugging errors and problems with your programs. Here are some resources you should be familiar with:

* [StackOverflow](https://www.stackoverflow.com/" \t "_blank) — a community question and answer site where people discuss programming issues. You can find Python-specific questions [here](https://stackoverflow.com/questions/tagged/python" \t "_blank).
* [Google](https://www.google.com/" \t "_blank) — the most commonly used tool of every experienced programmer. Very useful when trying to resolve errors. [Here’s](https://www.google.com/search?q=python+typerror" \t "_blank) an example.
* [Python documentation](https://docs.python.org/3/) — a good place to find reference material on Python.

Once you have a solid handle on debugging issues, you can start working on your own projects. You should work on things that interest you. For example, I worked on tools to trade stocks automatically very soon after I learned programming.

Here are some tips for finding interesting projects:

* Extend the projects you were working on previously, and add more functionality.
* Check out our list of [Python projects for beginners](https://www.dataquest.io/blog/python-projects-for-beginners/" \t "_blank).
* Go to Python [meetups](https://www.meetup.com/" \t "_blank) in your area, and find people who are working on interesting projects.
* Find open source packages to contribute to.
* See if any local nonprofits are looking for volunteer developers.
* Find projects other people have made, and see if you can extend or adapt them. [Github](https://www.github.com/" \t "_blank) is a good place to find these.
* Browse through other people’s blog posts to find interesting project ideas.
* Think of tools that would make your every day life easier, and build them.

Remember to start very small. It’s often useful to start with things that are very simple so you can gain confidence. It’s better to start a small project that you finish that a huge project that never gets done. At [Dataquest](https://www.dataquest.io/), we have guided projects that give you small data science related tasks that you can build on.

It’s also useful to find other people to work with for more motivation.

If you really can’t think of any good project ideas, here are some in each area we’ve discussed:

**Step 5: Keep working on harder projects**

Keep increasing the difficulty and scope of your projects. If you’re completely comfortable with what you’re building, it means it’s time to try something harder.

You can choose a new project that

Here are some ideas for when that time comes:

* Try teaching a novice how to build a project you made.
* Can you scale up your tool? Can it work with more data, or can it handle more traffic?
* Can you make your program run faster?
* Can you make your tool useful for more people?
* How would you commercialize what you’ve made?

**Going forward**

At the end of the day, Python is evolving all the time. There are only a few people who can legitimately claim to completely understand the language, and they created it.

You’ll need to be constantly learning and working on projects. If you do this right, you’ll find yourself looking back on your code from 6 months ago and thinking about how terrible it is. If you get to this point, you’re on the right track. Working only on things that interest you means that you’ll never get burned out or bored.

Python is a really fun and rewarding language to learn, and I think anyone can get to a high level of proficiency in it if they find the right motivation.

**CHAPTER THREE**

**EXPECTED RESULT**

E-learning is becoming more popular day after day due to the rapid technological advancements made especially in ICT. Disappointedly, the under-developed countries like Nigeria are yet to implement e-learning effectively, for the acquisition of Education, knowledge, skills and training. This is partly because of the inadequacy of the required infrastructure and the improper attention given to its impact. Although most of the tertiary institution had already commenced the use of e-learning, it is mostly implemented for administrative purposes such as examination.

This proposed project paper presentation, therefore, attempts to create a web based, CAL application software for the learning of Python Programming language.

At the completion of this proposed project work the following results will be achieved;

1. The E-learning platform will enhance and complement the traditional and learning methods within the department
2. It will simplify the learning of python Programming language for the students of the department
3. It will serve as a guild on learning in the department based on python programming.
4. It will help tutor to be more effective and efficient.

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