

# Learning C++ using Web: Analyzing Student Preferences

Aprajita Singh  
Assistant Professor, MCA  
Thakur Institute of  
Management Studies,  
Career Development and  
Research (TIMSCDR)

Chinmay Chavan  
Research Scholar, MCA  
Thakur Institute of  
Management Studies,  
Career Development and  
Research (TIMSCDR)

Suraj Chourasiya  
Research Scholar, MCA  
Thakur Institute of  
Management Studies,  
Career Development and  
Research (TIMSCDR)

## ABSTRACT

C++ is a deeply practical language; it continues to exist to solve practical engineering problems. An effort to teach C++ as the introductory language for fresh programmer's majors has always been, and continues to be perplexing. C++ is probably the least beginner-friendly among all the other mainstream programming languages, because it is a complex language as it takes a long time to develop a good mental model of C++. We are investigating the ways and means used or preferred by students of Master in Computer Application course to learn C++ as a language. The research paper analyses, which technique is used by the students for better understanding of the language, based on a survey conducted to provide evidence. Based on this survey we will come to know the best practices that are used by students for understanding concepts in C++. This paper also investigates whether the students use the web to study and how important it is for them to use internet based content for learning the subject well.

## General Terms

C++, web based learning

## Keywords

Studying, C++, Web, Student

## 1. INTRODUCTION

Today there are many programming languages like Java, C++, ASP.NET, C# which are used for developing software's and other programming purposes. These languages are logic based languages and tricky to understand. Hence some students fail to understand these languages clearly and their conceptual knowledge is weak.

Learning to program is generally considered tough, and programming courses have high dropout rates. It has even been said, that it takes about 10 years for a novice to become an expert programmer [6]. Educational research has been carried out to recognize the characteristics of new programmers and to study the learning process and its connections to the different aspects of programming.

On the other hand, some students easily understand these concepts. There is a huge difference in knowledge between these two people. As an employee it affects his performance at the work place and as a student it affects the marks. Hence we decided to carry out a survey to find out which are the best techniques like Books, Online courses, E-Books, Online videos or notes. We have chosen C++ language for the survey as it is a mid-level language and it is taught at every educational level from schools to graduation level. C++ is most commonly used language for educational purpose.

This paper makes an attempt to find the students thought on studying C++ programming language and how important do they think it is to learn C++ at the Master in computer application course. This paper also investigates whether the students use the web to study and how important it is for them to use internet based content for learning the subject well.

There are various sources on web to study C++ online like YouTube, E-Books and websites namely [www.stackoverflow.com](http://www.stackoverflow.com). Students watch videos and online tutorials where different concepts are explained and elaborated with the help of good examples.

There are websites which allow us to code and compile our code online. [5] Prensky (2001) young graduate from college spend 10,000 hours on video games, 20,000 hours watching TV. He also stated that games on digital devices, email, Internet, smart phones and messaging have become integral parts of students' their lives". Students are accustomed to interacting with audio and video content on electronic devices, so it stands to reason that they would digest educational content provided to them online.

Just as twenty-first century students are comfortable with electronic devices, they also thrive on learning in social situations. [4]Shroff and Vogel (2009) claimed that it is important to look for clues as to how e-learning technologies have become powerful catalysts for change as well as tools for redesigning our learning and instructional ways. Education is fundamental to society, now is the time for public education to accept the proliferation of online learning opportunities to enhance daily classroom experiences.

In 2001, Chan stated that the growth of information and communication technology, mainly internet-related technology, has changed how, what, who, when, why and where we learn (as cited in Lee, 2005)[3].

C++ is a practical language which continues to exist to solve practical software related engineering problems. More practices helps one write better code.. "Many of the online courses in programming by Coursera, edX and Udacity all give great concentration on programming ideologies than the language [2].The main way in which you learn C++ is by writing lots of code in C++. Most of the other programming language also is the same as well. That being said, though, C++ is less beginner-friendly compared to all other mainstream programming languages. And is quiet complex also thus it takes a long time to be friendly and developing a good mental model of it. But you can better it if you read a good book on C++. The language is so complicated that most C++ programmers even don't understand the language very well, so most books on C++ are not up to the mark.

The ubiquitous nature of online tools and the pervasiveness of students' electronic device usage create a ideal situation in which the flipped classroom concept may increase student learning. Information on their use is however lacking for post graduate student doing MCA. Therefore, the goal of this study is to examine the student perceptions, and academic results of MCA students.

Around hundred students pursuing MCA were asked to fill survey questionnaire and responses were analyzed. Priority of the survey was to find out the source from which the student prefers to study C++ language. Students were given options from which they s had to select and were asked whether they understand the programs taught to them during lab sessions in the institution. This helped understand that whether they think the lab session and classroom study has helped students understand the concepts well.

## 2. RESEARCH STUDY

The research study includes an online survey carried out for all students studying C++ at the MCA level in Mumbai. Around five questions on similar line were asked. Respondents were mostly from Mumbai area. Online survey was conducted so that respondents can give their view easily and at leisure , which is very important for the study to be authentic.

### A. Objectives

The primary research was carried out with following objectives:

- To identify usages of the internet by students for the purpose of studying programming languages like C++.
- To identify student preference on the web or otherwise to study subject like C++.

### B. Methodology

Primary data was collected by the survey responses. Secondary data was collected from the internet. Various research papers on the same lines were also consulted. Findings from them have been listed in the following paragraph

### C. Analysis and Discussion

Survey questions filled by the respondents are discussed below. Graphical representation of results are put in a where ever necessary.

Responses from 90 respondents were collected and analyzed.

Question 1: How important is it to study C++ programming language for students studying MCA?

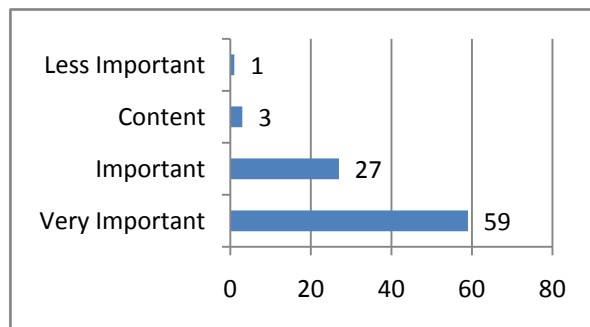


Fig 1: Importance of studying C++

Ninety five percentage respondents think it is important or very important to study C++ programming language. This question aims at finding out how important do students think

the subject is and then only they will try to explore various methods to learn it better.

Question 2: You prefer to study C++ from?

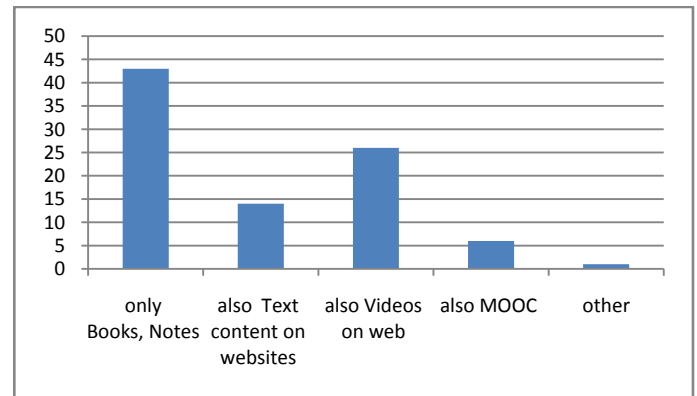


Fig 2: C++ Student preference for studying C++

Almost all students study from the books or e-books or subject notes. But 47% students study from only books or e-books or notes. 15.5% students additionally study by reading text content on the web.28.8 % student also view videos on the web to understand the topic or may be find the videos better to grasp concept or have access to the web easily. The study indicates clearly the students prefer to view videos on the web than looking at text content on the web. Less than 7% have an idea about massive online learning courses. Students study is mostly exam oriented thus they do not explore other ways and means to understand the concepts.

Question 3: What helped you the most to write theory exam better?

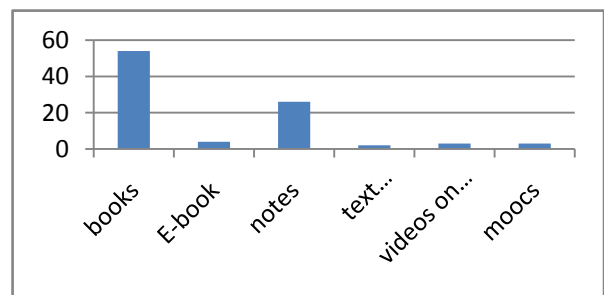
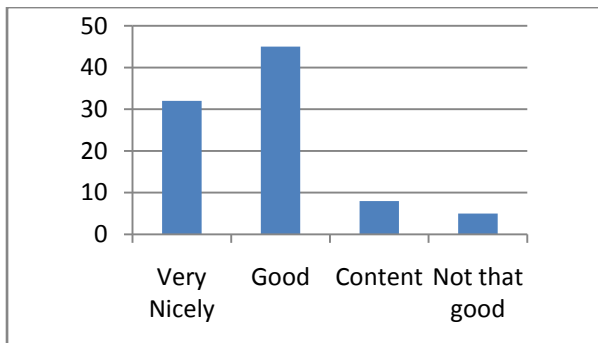


Fig 3: Student's preferences on what helped them the most to write theory exam better?

Student study from book or notes for theory exam they do not refer or prefer to go to the web for help in case of theory exam. The study indicates that 89 percent student refer notes or books for preparing for subjective exam in programming language like C++.

Question 4: How well do you think you have understood the concepts like, Conditional statements -Loops, If, Switch - Arrays -Operator Overloading -Inheritance -Files - Templates.



**Fig 4: How well students have understood the concepts**

Students think they have understood the concepts well by whatever they study from. And as mostly they study from books notes or online videos, it has helped them understand the concepts well.

Students were asked to give their input on the kind of lab experiments given to them, has it helped them to develop the logic of the program better? 91.1% voted for “Yes” and 8.8% for “No”. Later they were asked whether the lab experiments helped them to understand the syntax better. 94.4% students agreed to it and only 5.5% students disagree.

Now 82.2% think they are able to write a program by themselves and 17.7 % students disagree on this.

The knowledge of new programmers tends to be context specific rather than general [7], and they also often fail to apply their knowledge correctly. Usually an average student does not make much progress in an introductory programming course [8]. This was also noticed by the study of McCracken et al. [1], who noticed serious deficiencies in student's programming skills in introductory courses.

### 3. FINDINGS

C++ is a practical language which continues to exist to solve practical software related engineering problems. More practices helps one write better code. The main way in which you learn C++ is by writing lots of code in C++. Though, C++ is less beginner-friendly compared to all other mainstream programming languages.

And is quiet complex also thus it takes a long time to be friendly and developing a good mental model of it.

Students study is mostly exam oriented thus they do not explore other ways and means to understand the concepts. Student study from book or notes for theory exam they do

not refer or prefer to go to the web for help in case of theory exam. The study indicates that 89 percent student refer notes or books for preparing for subjective exam in programming language like C++.

Students think that study from books notes or online videos help them understand the concepts well. Students also happen to learn from lab session and the kind of lab exercises given to them they think helped them write better code.

Results show that students do not explore to learn more from the web as they are exam oriented thus they prefer to study from notes to prepare for exams. Online videos are preferred by student's then online text content. They listen to videos to comprehend concepts than read content online.

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