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# Distance Learning Techniques for Object Oriented Programming

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**Abstract**

Even though there are several programming paradigms e.g. procedural and functional, most of the code we write today is object-oriented and some of the most popular programming languages are object-oriented e.g. Java, Python, PHP, and JavaScript all supported object-oriented programming. More than 1.5 billion students and youth across the planet are or have been affected by school and university closures due to the COVID-19 pandemic. The use of effective distance learning techniques for object oriented programming is especially relevant nowadays, during the COVID-19 pandemic. This work is an attempt to summarize the problems facing teachers and students in this situation and to make online learning effective by combining many years of practical experience in distance learning with modern technologies available through the Internet.

*Keywords:* object oriented programming, distance learning, online learning

## 1 Introduction

Object-oriented programming (OOP) is a programming paradigm based on the concept of "objects", which can contain data and code: data in the form of fields (often known as attributes or properties), and code, in the form of procedures (often known as methods) [1].

Many of the most widely used programming languages (such as C++, Java, Python, etc.) are multi-paradigm and they support object-oriented programming to a greater or lesser degree, typically in combination with imperative, procedural programming. Significant object-oriented languages include: (list order based on TIOBE index) Java, C++, C#, Python, R, PHP, Visual Basic.NET, JavaScript, Ruby, Perl, Object Pascal, Objective-C, Dart, Swift, Scala, Kotlin, Common Lisp, MATLAB, and Smalltalk [1].

Probably the most commercially important recent object-oriented languages are Java, developed by Sun Microsystems, as well as C# and Visual Basic.NET (VB.NET), both designed for Microsoft's .NET platform [1].

The TIOBE programming language popularity index graph from 2002 to 2021 is shown in Figure 1 [2].

The TIOBE Programming Community index is an indicator of the popularity of programming languages. The index is updated once a month. The ratings are based on the number of skilled engineers world-wide, courses and third party vendors. Popular search engines such as Google, Bing, Yahoo!, Wikipedia, Amazon, YouTube and Baidu are used to calculate the ratings. The TIOBE Index for March 2021 is shown in Figure 2 [2].
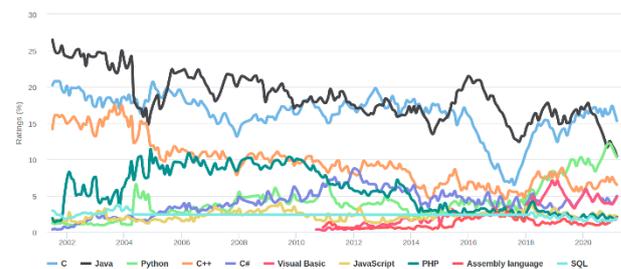


FIGURE 1 TIOBE Programming Community Index

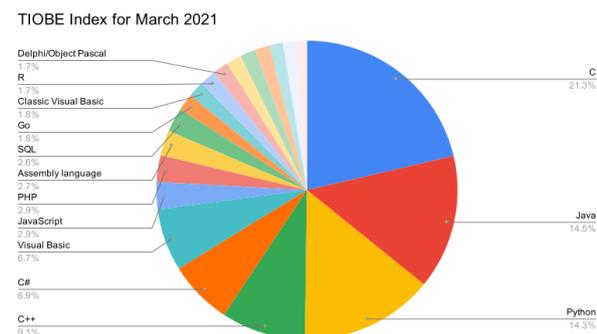In the 2000s the object-oriented Java (blue) and the procedural C (black) competed for the top position [1].



FIGURE 2 TIOBE Programming Community Index

The Institute of Electrical and Electronics Engineers (IEEE) has posted a ranking of programming languages for 2020 on its website (Figure 3 [3]).

Rankings are created by weighting and combining 11 metrics from 8 sources: CareerBuilder, Google, GitHub, Hacker News, the IEEE, Reddit, Stack

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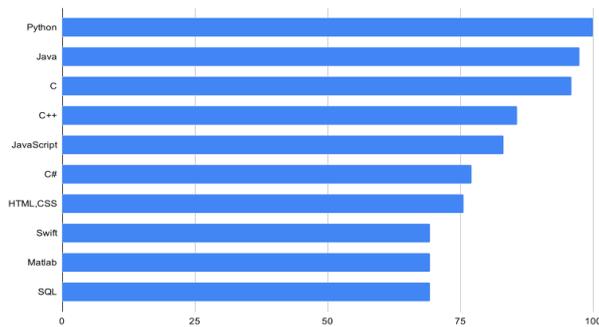Overflow, and Twitter [3].



FIGURE 3 IEEE: The Top Programming Languages

The top three have not changed: they are Python, Java and C.

Thus, training of candidates for junior programmers in object-oriented programming languages is currently relevant and in demand by commercial software companies.

The COVID-19 pandemic has left universities and colleges scrambling to bring all courses online - with little preparation or time for instructors to make the transition. And with the immediate and long-term future of higher education delivery uncertain at best, it's a safe bet that most if not all courses will require at least some online components. Instructors who are new to the online learning environment may feel a lot of anxiety about how best to provide their students with the learning experience they deserve [4].

In 2017, 6.6 million students enrolled in distance learning. Due to the spread of COVID-19, that number has skyrocketed to over 400 million students. Online learning from a distance has become a go-to method of education, especially as we all adjust to new circumstances presented by the COVID-19 pandemic [5].

## 2 Overview

A relatively short scan of the full and often freely available online distance education (DE) reports can show a teacher precisely how to organize efficient text discussions and audio and videoconferences and can provide references to highly relevant specialized studies in other areas of the literature.

The Technical Reports section of the International Review of Research in Open and Distance Learning discusses best and worst practices for the use of online educational software. The media and software evaluated in these reports have changed over the years, but the features common to the efficient DE practices that they enable have largely remained constant.

With the current pandemic in mind, UNESCO (2020) has provided an updated list of resources and solutions, perhaps perplexing in its length and complexity for those who require fast solutions and evaluative evidence [6].

## 3 Decision

This work is an attempt to make online learning for object oriented programming effective. Distance learning technologies offer a myriad of benefits for OOP learning education, including convenience, flexibility, effectiveness, and efficiency.

Modern Internet technologies allow us to take full advantage of these benefits. However, there are also a number of problems.

## 4 Conclusion

Unfortunately, sweeping, fallacious criticisms of DE research by influential educators such as the Global Learning Council (GLC) actively disparage the traditional DE literature; and the distinction between emergency remote education and traditional DE will be meaningless to them. Criticisms of online learning in widely read outlets such as Forbes magazine (Tyre, 2020) will also obstruct the attempt to promote its pandemic solutions [6].

However, as practice shows, the combination of many years of practical experience in distance learning with modern technologies can significantly increase the effectiveness of online learning for object oriented programming.

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