Introduction

“Polymorphism is ability for an object to take on many forms,” according to the website Tutorials Point. It is one of the “3 Pillars of Object Oriented Programming (OOP),”which is used by pretty much all software companies in some way, shape, or form. Therefore, it is an important concept for computer science, computer engineering, and software engineering students to learn, yet 47.96% of Iowa State students fail Com S 227 (the class polymorphism is first taught in). Polymorphism is briefly reviewed in Com S 228 and then it is expected that students understand this concept for all following OOP courses. The current materials for students are not helping students learn polymorphism.

Textbooks

First, let’s talk about textbooks or rather the lack of textbooks. Com S 227 and Com S 228 do not have a required textbook. Com S 277 does, however, have a recommended textbook, *Java Concepts (Early Objects).* This 708 page book spends one page covering polymorphism compared to the eight pages it spends on variables. Polymorphism is a much more complex concept, but Cay Horstmann decided that it only deserved one page. Inheritance, which is another one of the three pillars of OOP, has an entire chapter dedicated to it. How are students supposed to learn everything about polymorphism in one page?

Google Searches

In the technology dependent age we are in, students seek out the internet when they do not understand. The problem is that when I put polymorphism into Google it brought up 15,200,000 results. That is well over 20 pages worth of results. No one is going to go through ten pages of results let alone twenty. The second problem with this search is the actual information it brings up. Only half of the information on the first five pages are related to programming. Polymorphism is also a concept in biology and genetics. This makes it harder for students to find relevant information.

Websites

I decided to look at the first three relevant results that Google produced. Wikipedia, Tutorials Point, and Oracle all proved to be unhelpful. Wikipedia’s first sentence, “In programming languages and type theory, polymorphism (from Greek πολύς, polys, "many, much" and μορφή, morphē, "form, shape") is the provision of a single interface to entities of different types, is worded so complicatedly that it would not make sense to someone who was trying to understand polymorphism. The other two websites are the same way. They overcomplicate the wording and explaination making it impossible for a student to understand.

YouTube

I have found that tutorial videos are usually helpful when learning programming concepts. When looking up polymorphism, I had the same issues as with Google. There were 51,700 results and they were not all related to programming. I started with a video by Derek Banas because I have found his videos helpful before. This video was thirteen minutes long and it was not dedicated to

polymorphism. He didn't start taking about polymorphism until about five minutes in. Most people would have stopped watching by then.

The next video, "Java Basics – Polymorphism," was more visually appealing and contained good content but the people talking were boring to listen to. Quite a few of the commenters mentioned that they could not pay attention to the whole video because of the monotone voice. The "Java Basics" video was eleven minutes long so, it had the same issue as the video by Derek Banas. The last video, "Polymorphism," was the best. It was visually appealing, only about three minutes long, and had really good content. The only problem was that it lacked a few important concepts of polymorphism.

Conclusion

I asked my fellow classmates and only half of them stated that they did not struggle with learning polymorphism. None of the resources available for students are sufficient enough to teach students polymorphism. They are no textbooks for students to use, the websites are too complex, and the videos either are too long or lack important information. This leaves students to have to rely solely on what the professors teach. Students need supplemental quality supplemental resources in order to fully learn polymorphism.

Work Cited

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