

Teaching Visual Basic after C++/Java

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Abstract

C++ is used in our CS1 course to teach the basic concepts in procedural programming and Java is used in our CS2 course to teach data structure and object oriented programming concepts.

We also offer two programming courses on Visual Basic. The first VB course requires the CS1 course and focuses on GUI programming, and the second VB course requires the CS2 course and covers advanced VB topics.

In both VB courses, written tests are replaced by hands-on tests that are carried out in lab. The students have open access to all resources they want to use, but they are required to create VB programs individually.

Teaching Programming Concepts

Our department offers two majors: Computer Science, and Software Engineering. The computer Science major has two emphasizes: Computer Information Systems, and Computer Technology. Both majors require two programming courses: Programming in C++ (CS1), and Object Oriented Programming and Data Structures I (CS2). C++ is used in our CS1 course to teach the basic concepts in procedural programming: if statement, while and for loops, arrays, functions and parameters, structures, and array of structures. Java is used in our CS2 course to teach data structure and object oriented programming concepts. The Software Engineering major and the Computer Technology emphasis also require another course: Object Oriented Programming and Data Structures II (which is elective for Computer Information Systems).

We also offer two programming courses on Visual Basic. VB is a very popular and powerful programming language, especially for business applications. We think that it is important for CIS students to master the language. We started to offer the first VB programming course in Fall 1997. Then we realized one course was not enough to cover the entire scope of Visual Basic and started to offer the second course in Spring 2002. Although both courses are elective for CIS students and not required for any major, most CIS students and some CT students take the first course. Some students in other majors (including Engineering, Math and others) also take it. Software Engineering students normally do not take these courses, since they have too many required courses for the major already. Due to increasing enrolment, we now offer two sections of the first VB class every fall semester and one section of the second VB class every spring semester.

We do not think that it is a good approach to teach basic programming concepts using VB in the CS1 and/or CS2 courses, event for CIS students. Those concepts are very important to the students in their future career. But for many students, those programming concepts are not easy to understand. We have another course "Introduction to Programming" to help those students who have some difficulty to pass the CS1 course. Still, not all students can pass the CS1 course the first time. Using Visual Basic in CS1 and CS2 will increase the difficulty because its visual features. Although the nice Integrated Development Environment may help the students in some situations, it could prevent the students from digging deep to understand the concepts behind the IDE. We do not want them to become such VB programmers who know how to use the IDE to create forms without understanding the concepts. To be successful in their future career, the students need more than one programming language. We feel some other programming languages such as C++ are more suitable to teach the basic programming concepts.

Teaching Visual Basic

Our first VB course requires the CS1 course. Since the students have grasped the basic programming concepts, we just go over the syntax of VB whenever it is necessary and focus on creating GUI interfaces, handling events, and accessing database.

Event procedure is a new concept to the students, but most of the students pick it up very quickly. We think this is an advantage of teaching VB after CS1. The students also learn how to create GUI interface quickly. However, when the interface is not that simple, it becomes rather difficult for some students. One example is to place controls on a form at run time. We want our programs to run on all PCs and display the same GUI interface. Since PCs have monitors of different sizes, we need to place controls on a form at run time depending on the monitor's size. Also, when a user resizes a form, we may also want the form to look the same and adjust the positions of some controls. It involves some mathematics calculations and also requires the students have some imagination.

The most difficult task in the first VB course is accessing database. The students have not taken any database course yet, but the simplicity of the relational model and the adapter provided by .NET make it rather easy for them to program simple database applications. But for complex SQL queries, some students get confused. For example, write a query with parameters, modify a query at run time, and multiple tables with primary key and foreign key. It seems not a good idea to ask students to access database without adapters in the first VB course.

The second VB course requires both CS2 and the first VB course, and our intention is to provide an opportunity for the students to go to professional level. To achieve that goal, other background seems also necessary. For example, it is very difficult to learn multi-threading in .NET without some background in operating systems. We are considering replacing the CS2 course with the Operating Systems course as a requirement. (The OS course requires the CS2 course.)

The second course was offered the first time in Spring 2002 using VB6. VB.NET is used for the course this spring. Since the students should understand the concepts in Object Oriented Programming, we go over the OO features of VB.NET very quickly at the beginning of the course. Then we cover other important issues in VB.NET, such as creating controls dynamically, creating custom controls, visual inheritance, database applications, Multi-Threading, Windows server, Web applications, and Web server.

The students will do a group project in the course, and we are looking for real applications. There normally exist some projects on campus that are suitable for the students to complete. We also try to get projects from outside.

Hands-On Testing

One feature in the two VB courses is that all quizzes and tests are carried out in Lab. The students are required to create a VB program individually during a quiz/test and they have open access to all resources they want to use. The students can also get help from the instructor during a quiz/test, but that will result in a reasonable penalty.

We started to use hands-on testing in Spring 2002 in the second VB course. Before that, written tests were used, and many students complained that they couldn't remember the

exact syntax of VB during tests even they were able to do it using computer. We discussed the issue in our department and brought it to the department's Advisory Board meeting. The Advisory Board members are from some computing industry companies and all of them think that it does not do much good to the students to ask them to memorize the exact syntax and support hands-on testing. With the support from industry community, we decided to try hands-on testing to replace written testing.

During a test, each student uses one computer to create a program individually. The students can bring their textbooks and any other books, notes from class, their programs (even graded), and any other materials they want to use. They have the entire .NET help system to use, and also have open Internet access. If a student has a problem that prohibits him/her to continue the program, the student can ask for help from the instructor. The penalty is about 10% of the total points on the test.

The feedback from students is very positive. Most students like the hands-on testing and enjoy the challenge. They try very hard to prepare for the tests, since they know they will fail if not prepared. This eventually forces the students pay close attention in class and do programming assignments very seriously. Some students also try to go beyond what covered in the class. Overall, the students receive better grades than before. We feel that the students are better VB programmers and deserve their better grades.

The students rarely complain about the hands-on tests, although there are a few students who feel too much pressure during such tests. Some of them failed or dropped the course. Although the number of such students is very small, help them is an important issue in the future.