Student Success with Java Online vs Java On-Ground

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Abstract

In this time of online education and all of the technologies that may encompass, one must still remember that the student is basically alone to navigate through the course. In many cases there is no face to face meeting with the Instructor. Not all students are capable of the discipline required to successfully complete an online course. Not all in the Academic community agree that online education works. This paper details a Java course that was taught both online and on ground during a period of 6 terms to approximately 300 students. All assignments and requirements were the same for each group of students. Both sets of students were surveyed at the completion of the course as to their attitudes toward the course materials and course structure. Final grades were assigned based on the students' programming skills. The final analysis shows that both sets of students were successful at the about the same levels with all the required programming.

Keywords: Online Education, Technical Course, Online support

1. Introduction

Online is the big buzz word in education these days. (Cronin, 2005) (Lee,2007) Students, especially the adult students want their education faster and more convenient. (Cavanagh,2006)   Many Universities are going on the premise that if we don't give the student what he wants, another institution will and then that student will be lost. Thus, many students will shop around for a higher educational experience, much as they would shop around for a new car. Adults are looking for a wide range of services from the College or University. (Yan,2004) The institution that meets their needs best with get their business. Students are very clear about what they want and are not afraid to demand it. (Henner, 2006)

Data from a Noel- Levitz study indicates that the most important enrollment factor for the prospective adult student is a convenient time and place for class. (Noel-Levitz,2005)   Therefore, many of the students who are enrolled in online education are adult students.

Online education exists in institutions across the world and many employers still do not value an online degree. (Carnevale,2007) Many Instructors also do not support this form of education. (Uzunboylu, 2007) In fact, many who are teaching online now were not initially happy about the prospect of doing so. The author was one who never thought a course such as java could be taught successfully online.   Many in administration view online education as a way of bringing in more students. Some have even felt that an online course may be less of a load for the Instructor than that of

an on-ground course. But this may not be the case. Anyone who has taught an online course can attest to the fact that it can often take more of the Instructor's time than an on-ground course. Many also believe that a technical course such a Java programming can not be taught well online and therefore it is a less that quality educational experience for the student. (Cox, 2005)

There are many approaches to teaching online. But there are also many different approaches to teaching on-ground. Two Instructors teaching the same course at the same University may be offering a completely different version of the same course material. Each Instructor has his own methods of teaching and the academic freedom that we all have enjoyed in the class room has been extended to the online arena. (Hamilton, 2006) Not all Instructors have embraced the concept of online education and not every student will be successful with an online course. The student must be very disciplined, self-motivated and mature. (Rovai, 2007) These student traits are exactly what is needed for an independent study or online course. Since the mean age for students in the Information Systems program at the author's University is 25, an online course may be just the right option for many of these students. Some students may need to be in a classroom listening to the Instructor explain the material and may not perform well in an independent learning environment. But for those who are willing to put in the time and effort, the flexibility of the online course format will pay off with a successful completion of the course.

This paper describes a beginning Java course that was taught both on-line and on ground. The period of time for this research was 6 terms or two years, including two summer terms. There were about 300 students enrolled in both the online and on-ground sections. The java courses were taught at Robert Morris University, a private institution in Pittsburgh Pennsylvania.

2. Course Structure

It has always been the practice of the author to provide a great deal of sample code for the students, no matter what programming language was being taught. Short sample programs seem to be a good way to illustrate a specific programming concept. That sample code is an essential part of both the online and on-ground java courses described in this paper. The mean age of students in the Information Systems Department at Robert Morris is 25. There was no significant difference in the age between the two sets of students. It also must be noted, that although there was no pre-testing of the students as to their programming knowledge, the same percentages of students from each group reported that this was their first programming course.

On-ground Course Structure:

Beginning Java was taught in a very traditional way to the on-ground students. The Java programming concepts were presented to the students in a lecture format. The students also participated in a lab session once a week, where they completed short programming exercises. Traditional in class exams were given. Many sample programs were written to assist the students in understanding the various programming concepts. Assignments consisted of a few short assignments in the beginning of the semester and an on-going large programming project that was completed in phases. The programming project also included documentation in the form of a User's Guide and a Programming Guide. A summary of the project is as follows:

- Phase I – Completion of the entire structure of the menu driven programming project using stub methods

- Phase II – Reading of data from various files into parallel arrays and reports generated from the data

- Phase III – Modifying the array data and writing the data back to the data files, as well as changing the program into an implementation of a class

- Phase IV – Additional reporting from the array data along with the required documentation

On-line Course Structure:

The structure of the online course was obviously different than that of the on-

ground course. But the material presented to the students was the same. There was no chatting done with the students, therefore all communication was done through email, or an occasional phone conversation. The online web site set up for the course consisted of various sections of materials. These included:

- An outline of all topics to be covered during the semester as they related to each chapter of the book

- Power point presentations illustrating various java concepts

- Sample java code

- Class notes – This section included all directions to the students as to how to approach the course, the assignments, the sample code, etc… The class notes also contained any additional explanations of java concepts and assignment clarifications as were needed as the semester progressed.

- Assignments were exactly the same ones as required for the on-ground students.

- One final exam in the form of an essay was given. The student had to explain various portions of his code. This was an attempt to ensure that the student did his own programming. The code was sent to the instructor and specific questions were formed concerning each student's code. The student was given a short amount of time between when the exam was made available and when it was to be returned.

3. Course Results Discussion

The Java course has been taught in the manner described in the previous section for the past six terms, including summer. There were a total of 125 on ground students and 155 online students enrolled during these terms. The class sizes ranged from 8 to 23 with the average class size being 21. Six on-ground students (5%) and eleven online students (7%) withdrew from the course at some point during the term. Thirteen on-ground (10%) and fifteen online students

(9.6%) received either a D or an F grade in the course. This grade of a D or an F was basically given for not completing a majority of the programming work. The remainder of the grades ranges are presented in table 1.

Table 1. Student final grading

	Online	On-Ground
A Grade	70%	54%
B Grade	10%	22%
C Grade	3%	8%

Those students who were able to complete all the functionality of the programming project along with the documentation were given the A grade. A larger percentage of the online students received an A for the grade in the course. Even though a grade is assigned, what is really being assessed is the level at which the student can program java at the end of the course. The project is quite involved and if the student is able to complete it, that is really the measurement. At first glance that might seem like grade inflation. But what actually happened, what that a great deal of help was given to this set of students as their programming progressed. They asked for help more often that the on-ground students. The on-ground students did ask questions during class time, but there was no measurement kept to track the number of questions asked. The on-ground student would send his code as an attachment to his email along with questions. If the problem was small, the code would be fixed and sent back with comments in the corrected section. If the problems were large, a phone call would be made to the student and he would be talked through the problems over the phone. Therefore, more of this set of students got all of the functionality of the programming project to work.

A survey was also given to both sets of students at the completion of the course to help assess the perception of the students concerning their course experiences. Although the questions are subjective on the part of the students, it does help to describe

the students' view of the course delivery. There was a 70% return rate on the survey. Of this percentage, 36% were on-ground students and 64% were online students. A summary of the responces is included in table 3 of the appendix.

It is interesting that the on-ground students reported a higher difficulty rating, as evidenced by the percentages of those who thought it was somewhat difficult - 69% of the on-ground students verses 42% of the online students. One might have expected that these percentages would be reversed. When it comes to the student's perception of the difficulty of the programming project, java methods, arrays and classes, the percentages are very close between the two groups of students. This might be due to the fact that there were many very short programs written that illustrated these concepts. These concepts were surveyed, because in the author's experience, these are the concepts students in a beginning programming course have the most difficulty with.

The online students did report that they spend more time that expected on the programming project. This seems reasonable, in that they were basically doing an independent study and were spending more time figuring things out on their own, rather than asking questions in class. While 93% of the on-ground students verses 81% of the online student reported they expected to finish the programming project, 90% of each set of students took the project to various levels of competition.

The online students did feel that the class notes were helpful. Class notes were used as an alternative to chatting. It was found that instead of explaining things over and over again to individual students, explanations and clarifications were placed in class notes and stored for all to download.

Appendix, table 1. illustrates the students' perception of the help that was available to them during the term. Both sets of students felt that the instructor was available for help, online students reported 93% and on-ground students reported 100%. It is clear that the majority of the online students did feel that the instructor was available and they did ask for help. In almost all cases, the instructor never met face to face with any of the online students. Once in a while,

an online student would stop by the instructor's office for help. But this only happened once or twice each term. More online students reported that they asked for the instructor's help than the on-ground students. The on-ground students possibly reported this because they were able to ask questions during the class room sessions. It seems that neither group went to the tutoring center for help. It has been reported to the Instructor that there often were not tutors available in the java language. That the on-ground students asked for help of each other and the online students do not is evidence that the online students really were doing an independent study course.

The students were also asked to rate the sample java code as to how helpful it was to them during the term. The scale was from zero, not helpful, to 4, most helpful. The online students rated the sample code at an average of 3.02 and the on-ground students rated it at 3.38.

Appendix, table 2. summarizes the results of the students' self-rating of their java skills before and after taking the course. Students were asked to rate their java skills on a scale of 0 to 4, with zero being the lowest and four being the highest. They were asked to rate themselves both before and after taking the course. As can be seen by the table, a majority of students rated their before skills as being very low, which does make sense. But after taking the course both sets of students reported that their skills had improved significantly.

4. Conclusions and Recommendations

Of course the online and the on-ground Java courses were taught differently, but all assignments were exactly the same for both sets of students. And, since the assessment of the students is done in terms of the completion of the project, this research has shown that a technical course such as Java can be taught successfully online.

Support for faculty is one issue that has not been addressed in this paper and that must not be ignored. Although it is not a conclusion, it is a recommendation that Institutions must provide technical support for those Instructors who are willing to

attempt the online courses. If the support is not there, the success of any online course can not be assured. (Gopalakrishnan, 2006)

Those teaching a course such as this must be very organized and attentive to the students. A policy of answering the student's email within 24 hours is extremely important. It is evidenced in this paper that the students did feel that the instructor was accessible. A study done by Yang and Cornelius also supports the concept that the students must receive feedback on a timely basis. (Yang, 2004) Help was available and given when needed. One student said; "Without a doubt this was one of the best online classes I have ever taken. The teacher was readily available; she responded to my emails fast and was very nice."

Cheating is an issue for both on-ground and on-line education. It is also impossible to prevent it completely. But having the students explain their code either on a traditional exam or on an on-line exam (with a very short return period) seemed to help in this area. If the student did not do their own programming, it was impossible for them to thoroughly explain what they turned in as their own work.

Often the programming books are difficult for the student to read and a small programming concept may be embedded within a complicated example. Therefore, the sample java code proved to be a valuable resource to the students. The online class notes also proved to be a time saver for the instructor. The same question did not have to be answered over and over. All students benefited from other students' problems and questions.

Some argue that the testing of online students is difficult, if not impossible. This may be true. But it is the view of the author that students learning to program java, is the most important outcome of this course, not memorization of terms and programming rules. It is clear that both sets of online and on-ground students have done just that, learned to program with java.

Future research should be done with other types of Information Systems courses, such as networking, database management and project management. More research also should be done to look further into what

works and what does not work for a technical online course.

Not all students can successfully navigate through an online course. It basically can be an independent study course and the student must possess a high level of discipline and maturity for such a course. But this data suggests that it is an option that can work if the student is willing to put in the time and energy along with the Instructor's commitment.

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5. Appendix

Table 1. Student help responces

	ONLINE			ON GROUND	
Instructor available for help	Yes 93%	No 5%	NOT SURE 2%	Yes 100%	No 0%
Ask the Instructor for help	Yes 79%	No 21%		Yes 70%	No 30%
Ask the tutoring center for help	Yes 0%	No 100%		Yes 7%	No 93%
Ask fellow students for help	Yes 22%	No 78%		Yes 77%	No 23%

Table 2. Student Java skill Ratings

	0	1	2	3	4
Online before	58%	17%	8%	11%	6%
Online after	8%	11%	33%	33%	14%
On-ground before	77%	8%	15%	0%	0%
On-ground after	0%	8%	31%	62%	0%

Table 3. Survey Results

	ONLINE			ON GROUND		
Difficulty of entire course	Not difficult 11%	Some what difficult 42%	Extremely difficult 44%	Not difficult 15%	Some what difficult 69%	Extremely difficult 15%
Difficulty of Programming Project	Not difficult 2%	Some what difficult 69%	Extremely difficult 27%	Not difficult 7%	Some what difficult 77%	Extremely difficult 15%
Difficulty of Java Methods	Not difficult 8%	Some what difficult 67%	Extremely difficult 11%	Not difficult 23%	Some what difficult 69%	Extremely difficult 7%
Difficulty of Java Arrays	Not difficult 30%	Some what difficult 58%	Extremely difficult 8%	Not difficult 30%	Some what difficult 53%	Extremely difficult 15%
Difficulty of Java Classes	Not difficult 38%	Some what difficult 61%	Extremely difficult 25%	Not difficult 13%	Some what difficult 61%	Extremely difficult 7%
Time spend on course	Minimal Amount 8%	Average Amount 50%	More than expected 36%	Minimal Amount 15%	Average Amount 69%	More than expected 15%
Helpfulness of online class notes	Helpful 64%	Not helpful 0%	Don't know 36%			
Expect to finish project	Yes 81%	No 0%	Not sure 11%	Yes 93%	No	Not sure 7%