

Student course evaluations and grades in CSE 142 and 143: Winter and Spring 2000 ¹

Nana Lowell, Zoe Clelland-Dunham
July 2000

OVERVIEW

The Office of Educational Assessment at the University of Washington administered a variety of questionnaires prior to and following CSE 142 and CSE 143 courses taught at the UW in traditional format, and at community colleges (CC) in Tutored Video Instruction (TVI) format. Analysis of the students responses was focused on student reaction to the TVI courses, and comparison of the academic performance of CC students using the TVI method to that of UW students enrolled in standard lecture courses. Winter quarter results indicated that students enrolled in TVI format were generally not as satisfied with the CSE course, highlighting technical problems and concerns about processor access. Additionally, UW students received higher scores on course exams and final course grade, partially due to marked differences among community colleges. Community college ratings of satisfaction with the TVI format appeared to improve over subsequent quarters, but further long term assessment is needed.

INTRODUCTION

This report provides supplementary information about the trial implementation of Tutored Video Instruction (TVI) to teach CSE 142 and 143 (Computer Programming I and II) at selected community colleges in the Seattle area during Winter and Spring quarters, 2000. This project has been described more fully elsewhere and so is outlined only briefly here.

During Winter quarter, 2000, University of Washington (UW) course lectures in CSE 142 and 143 were videotaped with the intention of using the tapes as a primary resource in offering those same courses on other campuses. The instructional model was based on an early study by Gibbons (1977)² in which peer facilitators moderated group discussions of taped lectures, stopping the tape to accommodate discussion on points that needed clarification or elaboration. Using this method, CSE 142 was taught at three local community colleges (Centralia, Green River and Shoreline) during Winter quarter, and three community colleges (Centralia, Green River, and Highline) during Spring. Also during Spring, CSE 143 was taught at three community colleges (Green River, North Seattle and Shoreline).

The intent of the current study was to obtain student reaction to the TVI courses, and to compare the academic performance of students taught using the TVI method to that of students enrolled in the standard lecture courses at the UW.

¹ Submitted as part of the evaluation of the Program for Educational Transformation Through Technology (PETTT).

² Gibbons, J.F., Kicheloe, W.R., and Down, K.S. (1977). "Tutored Videotape Instruction: A New Use of Electronics Media in Education." *Science*, 195(3), 1139-1146.

METHOD

Two types of data were collected on each student: self-report data obtained by means of pre- and postcourse questionnaires, and course exam scores and grades as assigned by instructional staff.

Precourse Questionnaires

A questionnaire relating to student expectations and preparation was administered to all students enrolled in CSE 142 during Winter quarter, and to community college students enrolled in either CSE 142 or 143 in Spring (see *Student Background and Expectations* in Appendix A). It was not administered to the UW students who took CSE 143 in Winter quarter. Items were multiple-choice or short-answer; seven related to student experience with computing, educational background and intentions, and three questions asked about student expectations of the course. In addition, community college students were asked how they expected the TVI format to compare to other college courses and whether they knew the course would be taught using this unique format before they enrolled.

Postcourse Questionnaires

At the close of Winter and Spring quarters, students were again asked to complete a questionnaire, this time about their experiences in their respective courses. The questionnaire administered to community college students was modeled on the standard course evaluation form administered to UW CSE 142 and 143 students (see *Student Experiences* and *IAS Form A*, respectively in Appendix B) and was comprised of six- and seven-point rating scales. Nine questions asked for an assessment of various aspects of the course such as the 'course as a whole', the 'amount learned,' and the 'relevance and usefulness of the course content.' An additional seven questions asked students to compare the course to other college courses they had taken relative to such things as their expected grade and the 'intellectual challenge' presented by the course. Community college students were also asked about technical problems they might have experienced.

Academic Performance

During Winter quarter, assignments and tests were scored at the University of Washington for community college as well as UW CSE 142 classes. Comparable data were not available for Spring quarter, because scoring and grading were undertaken by the respective community colleges.

FINDINGS

Precourse Questionnaires

Student responses to the *Student Background and Expectations* questionnaire are detailed in Appendix C (including coded responses to open-ended questions), and summarized below. Only statistically significant group differences are described (*chi square*, $p < .05$).

Winter quarter CSE 142: CC and UW students

Although most (89.7%) community college students did not know in advance that their course was to be taught in the TVI format, none expressed negative expectations of the course and almost half (42.6%) thought it would be better or easier than taking it at UW. Many (58.6%) expected to transfer to the UW.

Most UW students expected taping of the course would be useful in some way (49.8%) such as providing the means to make up missed lectures (10.0%).

Community college and UW students did not differ in their reason for taking the course. The majority (55-60%) of both groups enrolled in CSE 142 because it was required by their educational program and approximately half (48.5%) intended to complete an undergraduate degree in computer science or a closely related area. Community college and UW students also did not differ in programming experience. Most (74-84%) had not previously written a program in C, and approximately half had not written programs in any language.

Differences were found between community college and UW students in their frequency of computer use, with UW students reporting that they used a computer more frequently than did CC students. The highest proportion (45.2%) of UW students reported using a computer more than three hours per day, whereas the highest proportion (42.1%) of CC students reported daily use but less than three hours.

The groups also differed demographically. The largest number (50.2%) of UW students were freshman, whereas CC students were primarily (60.3%) sophomores. UW students fit the traditional four-year pattern more closely than did CC students: a higher percentage were enrolled full-time (97.0% vs. 86.0%), and their highest reported educational level was 'high school/GED degree' (42.2%) or 'some college' (42.2%). A notable proportion (10.5%) of the CC students did not have a high school degree, while the largest number reported having had 'some college' (54.4%).

Spring quarter CSE 142: CC students

Characteristics and expectations of CSE 142 Spring quarter community college students were similar to those of community college students in Winter, with the following exceptions:

Many more of the Spring quarter students were aware that the course was to be taught in TVI format than was the case in Winter (57.5% vs. 10.3%, respectively), and their expectations coming into the course were not as positive as was the case in Winter. Considerably fewer students expected that the TVI format would be easier than or the same as the UW course (35.0% vs. 68.5%, respectively), and while most Winter quarter students expected to learn more information (55.1%) in the TVI format than they would in the UW courses, many Spring students expected to learn less (48.2%).

Students who enrolled in Spring tended to have more academic experience than did Winter quarter students. Spring students were approximately equally comprised of individuals with 'some college' (35.9%) and those with an 'Associate of Arts degree' (41.0%), whereas the Winter group primarily consisted of students with 'some college' (54.4%).

Spring quarter CSE 143: CC students

CSE 143 is the follow-up course to CSE 142 and the background and expectations of Spring quarter students were compared for the two classes. The following differences were found:

CSE 143 students reported having more academic experience than did those enrolled in CSE 142 (50.0% had 'some college' vs. 35.0%), they had more academic experience (50.0% had 'some college' vs. 35.0%), and more planned to transfer to the UW (67.3% vs. 37.5%, respectively).

CSE 143 students were more likely than CSE 142 students to use a computer for programming (30.0% vs. 5.0%, respectively), and they had correspondingly more programming experience. Most (83.7%) CSE 143 students reported having written programs of 50-500 lines in C, and more than half (58.3%) had done the same in another language. The matching figures for CSE 142 students were 7.5% and 22.5%, respectively.

Postcourse Questionnaires

Responses to the *Student Experiences* questionnaire are detailed in Appendix D and summarized below. Only statistically significant group differences are described (*chi square*, $p < .05$). Figures 1 and 2 at the end of this section compare community college and UW students on Spring quarter ratings of general course quality and of the course in relation to other courses. Figures 3 and 4 compare each of the three community college student groups (Winter 142, Spring 142, and Spring 143).

Winter quarter CSE 142: CC and UW students

Community college (CC) students rated the technical quality of the videos as 'good' (mean rating=4 on a 6-point scale), yet most (80%) reported technical problems in viewing the course material and more than half (62%) felt that these problems interfered with their learning. Additionally, the rating of availability of resources required to complete the course was midway between 'fair' and 'good.' Most community college students did not enjoy taking the course and would not recommend it to a friend (62% and 64%, respectively).

Several similarities were found in the way community college and UW students described their experiences in the course. Both groups rated the 'reasonableness of assigned work' as 'good,' and they compared CSE 142 to other college courses they had taken in similar ways. Both groups rated the 'amount of effort required' and 'put into' the course, and their 'involvement' in the course as slightly higher than 'average.' The groups did not differ significantly in their estimates of the number of hours they spent on the course each week, or the number of those hours that were useful to their education. However, the distribution of the responses of community college students tended to be bi-modal (a higher percentage of students marking either a high or low number of hours than marked the middle of the scale). If this pattern accurately reflected the amount of effort required of community college students in general, it would suggest distinct types of enrolled students that may be best served by tailored pedagogical approaches. This pattern did not characterize responses of UW students.

Differences were found between community college and UW students in their overall assessment of the course. Community college students gave significantly lower course quality ratings with respect to the 'course as a whole,' the 'course content' and 'relevance of the content,' 'amount learned,' 'evaluative and grading techniques,' and 'clarity of student requirements.' The groups also differed in their expected course grade relative to other college courses they had taken, with community college students expecting a significantly lower course grade than did UW students.

Spring quarter CSE 142: CC students

Course-related experiences of CSE 142 Spring quarter community college students were similar to those of community college students in Winter, with the following exceptions:

Students enrolled Spring quarter gave significantly higher ratings (1=very poor, 6=excellent) than did Winter students to the 'course as a whole' (4.4 vs. 3.4), 'evaluative and grading techniques' (4.3 vs. 3.4),

and 'reasonableness of assigned work' (4.8 vs. 3.7). However, they gave lower ratings to the 'technical quality of the video' (2.8 vs. 4.3) and the 'availability of resources' (2.2 vs. 3.6).

Relative to other college courses taken, Spring quarter students gave higher ratings (1=much lower, 7=much higher) than did Winter students to 'expected grade' (5.4 vs. 3.4), and lower ratings to the 'intellectual challenge' (2.6 vs. 5.2), the amount of effort they 'put into the course' (1.9 vs. 5.2), the amount of effort 'required to succeed' (2.2 vs. 5.5), and their 'involvement in the course' (2.3 vs. 5.3).

Spring quarter CSE 143: CC students

During Spring quarter, CSE 143 was rated (1=very poor, 6=excellent) lower than was CSE 142 on nearly every aspect of the course from the 'course as a whole' to 'clarity of student responsibilities,' and a higher proportion of CSE 143 students also reported experiencing 'technical problems in viewing the course materials.' An exception was 'availability of resources' which was given higher ratings by the CSE 143 students. The groups did not differ in their ratings of 'evaluative and grading techniques' and 'technical quality of the videos,' or in the comparison of their course with courses taken previously. Generally speaking, they tended to view their respective courses as less challenging and requiring less effort than other college courses.

Figure 1. General CSE 142 course assessment

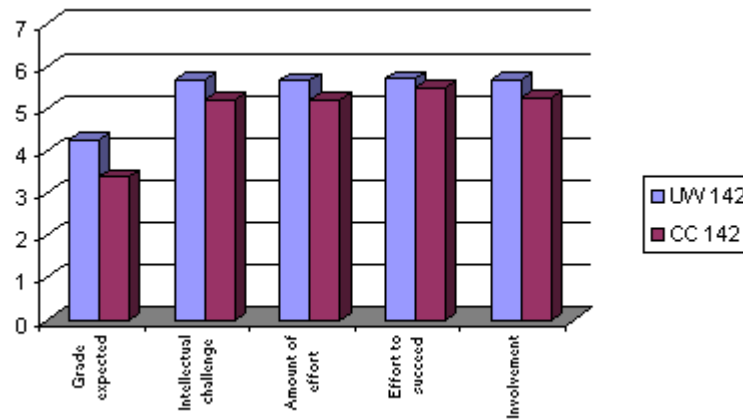


Figure 2. Relative CSE 142 course assessment

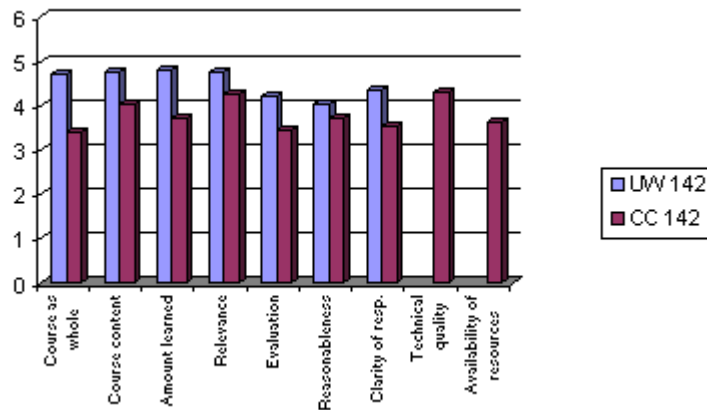


Figure 3. General CSE 142 and 143 course assessment

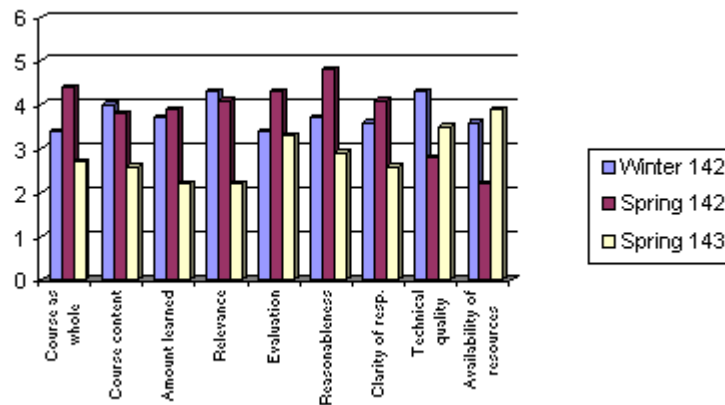
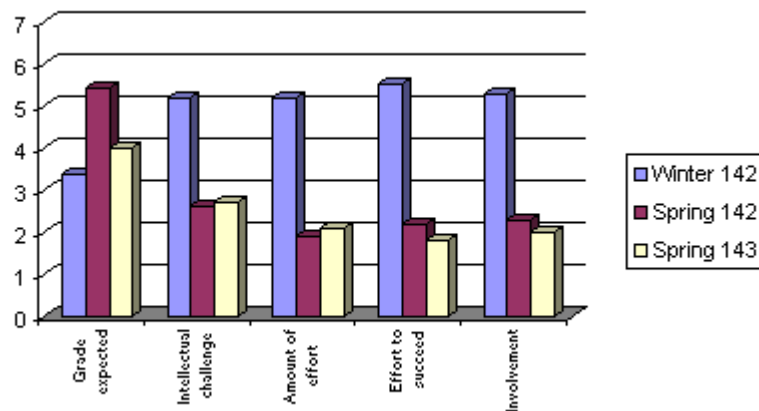


Figure 4. Relative CSE 142 and CSE 143 course assessment



Academic Performance

As noted above, only Winter quarter CSE 142 test scores and grades were assigned systematically and therefore are available for comparison. Table 1 (Appendix E) shows the average test scores and overall course grades for the various institutions. The corresponding figures below, Figures 5 and 6, graph test scores and grades by institution, and by UW section (designated as 'high preparation' or 'low preparation' based on student academic background), respectively.

Figure 5. Scores on homework, exams, and courses grade by institution

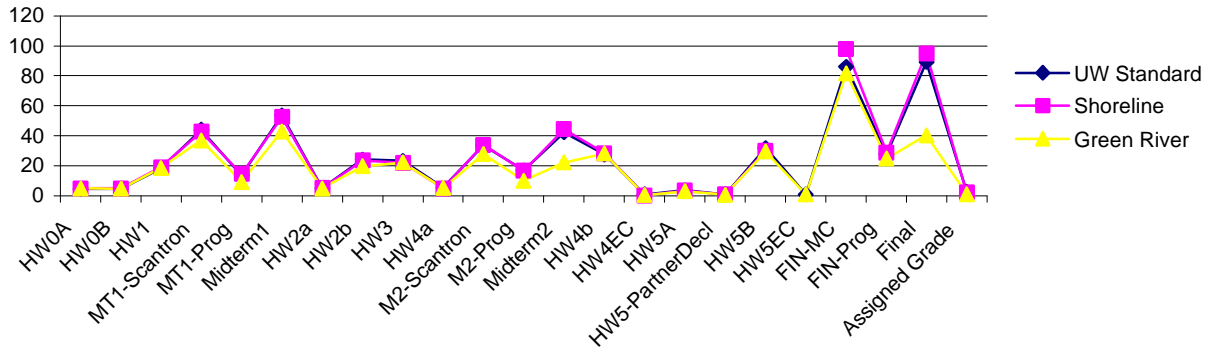
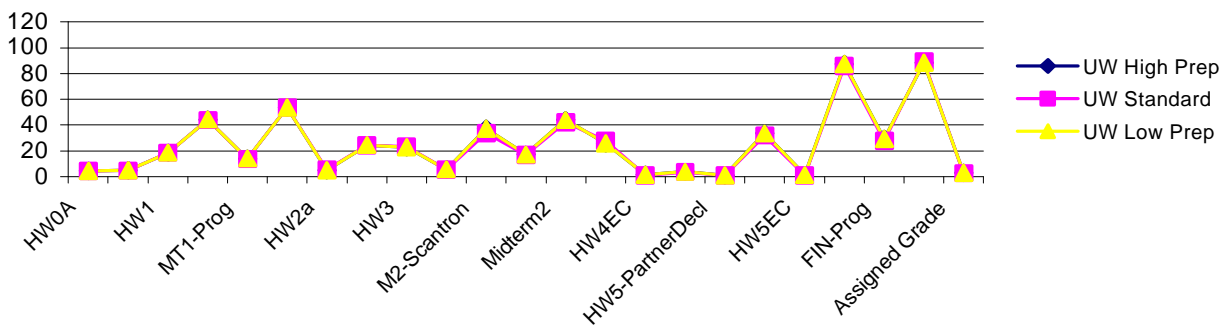


Figure 6. Scores on homework, exams, and course grade for UW students



Community college and UW students did not differ significantly on their first midterm scores, but significant differences were found on all subsequent exams and on final course grades. This finding does not reflect differences between performance of community college and UW students (e.g., TVI and standard lecture format) but rather differences among community colleges. Students at one institution in particular did not perform as well on course exams as did students from other community colleges and the UW. The erratic nature of CC grades may be a function of instructor or course structure, and the resulting superiority of UW performance may be misleading. This difference was not correspondingly apparent with respect to scores on assignments.

Academic performance also compared across UW student groups (low, standard and high preparation). No differences were found among UW student groups on course exams or final grade, indicating that performance in the course was not related to academic background. This may be due to a true lack of relationship between background as defined here and performance, or to the successful implementation of pedagogical strategies tailored to student background.

CONCLUSIONS AND RECOMMENDATIONS

Although the CSE 142 CC course is based on the UW CSE 142 course, differences did emerge, theoretically due to the nature of the TVI format. Students enrolled in the UW course were lower in class standing and were more experienced with general computer use. CC students were generally not as satisfied with the TVI format as were UW students in the traditional setting, and expected significantly lower grades.

Since the initial implementation of the CSE 142 course in community colleges in the Winter of 2000, it appears that several changes have occurred in the climate surrounding the TVI format. Students are more aware of the unique formatting of the course prior to enrollment and expect it to be more difficult than those of the Winter quarter. They also had concerns about professor access and communication. Interestingly, at postcourse assessment it was clear that students felt confident in their performance, and expressed positive reviews of the course, the work load, and the effort required to succeed during the term. In fact, although expecting the course to be difficult, they reported it was not particularly challenging, and required less effort than other courses. This finding is supported by the higher grades exhibited by students in the spring term. Students also indicated that they enjoyed the ability to stop the video and replay it, if necessary. On a more negative note, it was found that the video quality was still poor and that the availability of resources had worsened. Students indicated that the most common technological problems were that the camera focused on the professor instead of the overhead material, the sound and visual quality was poor, and the slides did not change with the video. Despite these issues, it can be concluded that the TVI format has become a more effective means of instruction over the past year and maybe continue to improve if sustained.

Findings suggest that CSE 143 students using the TVI format were likely to attend the UW and enroll in computer science or related programs. They had developed substantially more programming experience, probably extending from the prerequisite CSE 142 course. However, compared to the CSE 142 course in the same term, students were much less satisfied with the course overall, the work load, and their expected grade. This may have been a function of instructor differences, content difficulty, or merely stemming from the fact that this was the first time CSE 143 was taught in TVI format in the community colleges. Just as CSE 142 improved in the subsequent quarter, so too might CSE 143.

From the discussed findings, several recommendations can be made. First, students need to be informed of the TVI formatting of the course prior to their enrollment. Currently, students do not know what to expect from the course or the new technology, and this information will perhaps adjust expectations and increase satisfaction with the course. In as much as it is practically possible, content should be geared toward novice programmers, and students with some college credit. The technical quality of the video and sound equipment must be improved if instruction is going to be effective in TVI format, and perhaps instructors should offer additional compensation for the inadequacies of the current technology, such as overhead materials. Instructors must also ensure that students have access to assistance as much as possible. Generally, it does appear that TVI course format and instruction are improving with practice, although additional long-term assessment is necessary.

APPENDIX A
Precourse Questionnaires

This questionnaire is intended to provide information for course improvement and is completely voluntary. You may leave any question blank, or even the entire questionnaire -- this will not affect your grade in this course or other courses in any way. Because we would like to compare what you tell us on this questionnaire with questions we will ask you later, we ask you to create a personal alias. We will not know your alias, and your responses will be reported only in combination with those of other students.

YOUR ALIAS (your first pet's name + your mother's maiden name) =

1. Why are you taking this course?

2. When you signed up for this course, did you know it was a TVI (Tutored Video Instruction) course? 1. Yes 2. No

3. Describe what you think this TVI course will be like:

4. You'll be watching the same lectures as the students at the University of Washington -- how do you think your experience will compare to theirs?

5. Do you think you will learn more or less in this course because it's offered in TVI format?

0		1	2	3	4	5
Don't know		Learn much less		Learn the same		Learn much more

6. Do you plan to transfer to the UW? 1. Yes 2. No 3. Don't know

7. How much do you use a computer? What for?

8. What is the length of the longest program you have written in C?

1. None	2. Under 50 lines	3. 50-500 lines	4. Over 500 lines
---------	-------------------	-----------------	-------------------

9. What is the length of the longest program you have written in another language?

1. None	2. Under 50 lines	3. 50-500 lines	4. Over 500 lines
---------	-------------------	-----------------	-------------------

- 10. What is your class level?

1. Freshman	4. Senior
2. Sophomore	5. Running Start
3. Junior	6. Other

- 12. What is your highest educational level?
 1. Some high school
 2. High school degree or GED equivalent
 3. Vocational education certificate
 4. Some college
 5. Associate of Arts degree
 6. Bachelor's degree
 7. Graduate/professional degree

11. Do you intend to complete an undergraduate degree in computer science or a closely related area?
 1. Yes
 2. No
 3. Don't know

13. Are you a:

1. full-time student	2. part-time student
----------------------	----------------------

APPENDIX B
Postcourse Questionnaires

CC STUDENT EXPERIENCES

Course: _____

This is a follow up to the questionnaire your class filled out at the beginning of the quarter, to give us an idea of how the quarter has gone. The information you provide will be used for course improvement and your participation is completely voluntary. You may leave any question blank, or even the entire questionnaire -- this will not affect your grade in this course or other courses in any way. Because we would like to compare what you tell us here with the answers you gave on the earlier questionnaire, we ask you to use the same alias identifier so we can match your responses. We will not know your alias, and your responses will be reported only in combination with those of other students.

YOUR ALIAS (your first pet's name + your mother's maiden name) : _____

	Excel- lent	Very Good	Good	Fair	Poor	Very Poor
1. The course as a whole was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. The course content was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Amount you learned in the course was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Relevance and usefulness of course content were:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Evaluative and grading techniques (tests, papers, projects, etc.) were:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Reasonableness of assigned work was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Clarity of student responsibilities and requirements was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Technical quality of the videos was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Availability of resources required to complete course assignments was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Relative to other college courses you have taken:	Much Higher		Average			Much Lower	
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Do you expect your grade in this course to be:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. The intellectual challenge presented was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. The amount of effort you put into this course was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. The amount of effort to succeed in this course was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. Your involvement in this course (doing assignments, attending classes, etc.) was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. On average, how many hours per week have you spend on this course, including attending classes, doing readings, reviewing notes, writing papers and any other course related work?	<input type="radio"/> Under 2	<input type="radio"/> 6 - 7	<input type="radio"/> 12 - 13	<input type="radio"/> 18 - 19			
	<input type="radio"/> 2 - 3	<input type="radio"/> 8 - 9	<input type="radio"/> 14 - 15	<input type="radio"/> 20 - 21			
	<input type="radio"/> 4 - 5	<input type="radio"/> 10 - 11	<input type="radio"/> 16 - 17	<input type="radio"/> 22 or more			
16. From the total average hours above, how many do you consider were valuable in advance your education?	<input type="radio"/> Under 2	<input type="radio"/> 6 - 7	<input type="radio"/> 12 - 13	<input type="radio"/> 18 - 19			
	<input type="radio"/> 2 - 3	<input type="radio"/> 8 - 9	<input type="radio"/> 14 - 15	<input type="radio"/> 20 - 21			
	<input type="radio"/> 4 - 5	<input type="radio"/> 10 - 11	<input type="radio"/> 16 - 17	<input type="radio"/> 22 or more			
17. Did your class experience any technical problems in viewing the course material? If you did experience such problems, did they interfere with your learning? Please describe any technical problems that occurred:	<input type="radio"/> Yes	<input type="radio"/> No					
	<input type="radio"/> Yes	<input type="radio"/> No					

18. Did you enjoy the teaching format used in this course?	<input type="radio"/> Yes	<input type="radio"/> No
Would you recommend it to a friend?	<input type="radio"/> Yes	<input type="radio"/> No
How do you like it compared to more traditional classroom learning?		

19. What is your class level?	20. What is you highest educational level?	4. Some college
1. Freshman	1. Some high school	5. Associate of Arts degree
2. Sophomore	2. High school degree or GED equivalent	6. Bachelor's degree
3. Junior	3. Vocational education certificate	7. Graduate/professional degree
4. Senior		
5. Running Start		
6. Other		



Fill in bubbles darkly and completely.
Erase errors cleanly.

Instructor _____ Course _____ Section _____ Date _____

Completion of this questionnaire is voluntary. You are free to leave some or all questions unanswered.

	Excel- lent	Very Good	Good	Fair	Poor	Very Poor
1. The course as a whole was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. The course content was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. The instructor's contribution to the course was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. The instructor's effectiveness in teaching the subject matter was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Course organization was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Clarity of instructor's voice was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Explanations by instructor were:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Instructor's ability to present alternative explanations when needed was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Instructor's use of examples and illustrations was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Quality of questions or problems raised by instructor was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. Student confidence in instructor's knowledge was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. Instructor's enthusiasm was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. Encouragement given students to express themselves was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. Answers to students questions were:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. Availability of extra help when needed was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. Use of class time was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. Instructor's interest in whether students learned was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18. Amount you learned in the course was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19. Relevance and usefulness of course content were:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20. Evaluative and grading techniques (tests, papers, projects, etc.) were:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21. Reasonableness of assigned work was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22. Clarity of student responsibilities and requirements was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Relative to other college courses you have taken:

	Much Higher		Average		Much Lower							
23. Do you expect your grade in this course to be:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
24. The intellectual challenge presented was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
25. The amount of effort you put into this course was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
26. The amount of effort to succeed in this course was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
27. Your involvement in this course (doing assignments, attending classes, etc.) was:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>						
28. On average, how many hours per week have you spent on this course, including attending classes, doing readings, reviewing notes, writing papers and any other course related work?	<input type="radio"/> Under 2	<input type="radio"/> 6-7	<input type="radio"/> 12-13	<input type="radio"/> 18-19	<input type="radio"/> 2-3	<input type="radio"/> 8-9	<input type="radio"/> 14-15	<input type="radio"/> 20-21	<input type="radio"/> 4-5	<input type="radio"/> 10-11	<input type="radio"/> 16-17	<input type="radio"/> 22 or more

29. From the total average hours above, how many do you consider were valuable in advancing your education?

Under 2 6-7 12-13 18-19
 2-3 8-9 14-15 20-21
 4-5 10-11 16-17 22 or more

30. What grade do you expect in this course?

A (3.9-4.0) B (2.9-3.1) C (1.9-2.1) D (0.9-1.1) Pass
 A- (3.5-3.8) B- (2.5-2.8) C- (1.5-1.8) D- (0.7-0.8) Credit
 B+ (3.2-3.4) C+ (2.2-2.4) D+ (1.2-1.4) E (0.0) No Credit

31. In regard to your academic program, is this course best described as:

In your major? A distribution requirement? An elective?
 In your minor? A program requirement? Other?

APPENDIX C
Precourse Questionnaire Response Summaries

There were slight differences in the precourse questionnaires administered to community college (CC) and University of Washington (UW) students. Both groups of students were asked for their reasons in taking the course, their experience with computers and questions relating to their class standing. Additionally, community college students were asked about their fore-knowledge and expectations regarding the TVI format and whether they were intending to transfer to the UW. The summary below is based on the responses of 58 CC students and 444 UW students enrolled in CSE 142 during winter quarter, 2000. The percentage of students choosing each response option is shown. Differences between CC and UW students were tested using chi-square analyses, and those found to be significant have been marked (*= $p < .05$; **= $p < .01$; ***= $p < .001$).

Why are you taking this course?

	CC	UW
to learn how to program required	14.3	20.1
interested in programming	60.7	55.6
career purposes	8.9	10.3
see if liked it	7.1	3.3
other	8.9	6.4
		4.3

When you signed up for this course, did you know it was a TVI (Tutored Video Instruction) course?

	CC
1. Yes	10.3
2. No	89.7

Describe what you think this TVI course will be like: (CC – could not be coded, too varied)

Describe what you think this course will be like: (UW)

	CC	UW
will learn C programming		10.6
will learn basic programming		14.3
difficult/time-consuming		49.5
fun		5.6
other		19.9

You'll be watching the same lectures as the students at the University of Washington -- how do you think your experience will compare to theirs?

	CC
similar/same	25.9
better/easier	42.6
different atmosphere	20.4
not sure/don't know	7.4
easier	3.7

Do you think you will learn more or less in this course because it's offered in TVI format?

	CC
0 Don't know	
1 Learn much less	
2	6.1
3 Learn the same	38.8
4	46.9
5 Learn much more	8.2

Mean (values 1-5 only)

Do you plan to transfer to the UW?

	CC
1. Yes	58.6
2. No	15.5
3. Don't know	25.9

The course lectures are being recorded and archived on the course web site -- how do you think this will effect your experience in the course?

	UW
will be/has been helpful	49.8
useful if miss class	10.1
no effect	35.0
other	4.7

How much do you use a computer?

	CC	UW
1 infrequently	8.8	4.2 **
2 frequently	19.3	9.1
3 daily up to 3 hours	42.1	34.2
4 daily more than 3 hours	19.3	45.2
5 unspecified	10.5	7.3

What for?

	CC	UW
email, internet, homework	82.1	82.7
games, music, web design		
programming	7.1	10.6
network administration	1.8	.6
other	8.9	6.1

What is the length of the longest program you have written in C? (CC) Before the start of this course what is the length of the longest program you had written in C? (UW)

	CC	UW
1 none	83.9	74.0
2 under 50 lines	12.5	13.0
3 50-500 lines	3.6	11.2
4 over 500 lines		1.6

What is the length of the longest program you have written in another language? (CC)

Before the start of this course what is the length of the longest program you had written in another language?

	CC	UW
1 none	51.8	49.2
2 under 50 lines	25.0	21.6
3 50-500 lines	19.6	21.3
4 over 500 lines	3.6	7.9

What is your class level?

	CC	UW
1. Freshman	8.6	50.2 ***
2. Sophomore	60.3	19.9
3. Junior	6.9	20.8
4. Senior		4.5
5. Running Start	15.5	.9
6. Other	8.6	3.6

Do you intend to complete an undergraduate degree in computer science or a closely related area?

	CC	UW
1. Yes	60.3	48.8
2. No	22.4	26.4
3. Don't know	17.2	24.8

What is your highest educational level?

	CC	UW
1. Some high school	10.5	2.4 ***
2. High school degree or GED	19.3	42.2
3. Vocational education cert.	3.5	.3
4. Some college	54.4	42.2
5. Associate of Arts degree	8.8	8.9
6. Bachelor's degree	3.5	3.1
7. Grad/professional degree		.9

Are you a:

	CC	UW
1. full-time student	86.0	97.0 ***
2. part-time student	14.0	3.0

The same precourse questionnaire administered to UW and CC students winter quarter were used again in spring. The summary below is based on the responses of 40 CSE 142 students and 50 CSE 143 students enrolled during spring quarter, 2000. The percentage of students choosing each response option is shown. Differences between CSE 142 and 143 students were tested using chi-square analyses, and those found to be significant have been marked (*= $p < .05$).

Why are you taking this course?

	142	143
to learn how to program required	5.0	8.0
interested in programming career purposes	82.5	66.0
see if liked it	5.0	10.0
other	5.0	10.0
	2.5	4.0

When you signed up for this course, did you know it was a TVI (Tutored Video Instruction) course?

	142	143
1. Yes	57.5	52.0
2. No	42.5	48.0

Describe what you think this TVI course will be like: (could not be coded, too varied)

You'll be watching the same lectures as the students at the University of Washington -- how do you think your experience will compare to theirs?

	142	143
similar/same	20.0	28.0
better/easier	15.0	26.0
different atmosphere	22.5	16.0
not sure/don't know	2.5	
more difficult	17.5	10.0

Do you think you will learn more or less in this course because it's offered in TVI format?

	142	143
0 Don't know	27.5	18.0
1 Learn much less	12.5	4.0
2	22.5	16.0
3 Learn the same	25.0	34.0
4	7.5	16.0
5 Learn much more	5.0	6.0
Mean (values 1-5 only)	2.6	3.0

Do you plan to transfer to the UW?

	142	143
1. Yes	37.5	32.5
2. No	67.3	18.4
3. Don't know		

How much do you use a computer?

	142	143
1 infrequently	10.0	2.0
2 frequently	10.0	8.0
3 daily up to 3 hours	37.5	32.0
4 daily more than 3 hours	22.5	36.0
5 unspecified	20.0	22.0

What for?

	142	143
email, internet, homework	80.0	58.0
games, music, web design		
programming	5.0	30.0
network administration		
other	15.0	12.0

What is the length of the longest program you have written in C?

	142	143
1 none	75.0	
2 under 50 lines	15.0	8.2
3 50-500 lines	7.5	83.7
4 over 500 lines	2.5	8.2

What is the length of the longest program you have written in another language?

	142	143
1 none	45.0	14.0
2 under 50 lines	17.5	14.0
3 50-500 lines	22.5	56.0
4 over 500 lines	15.0	12.5

What is your class level?

	142	143
1. Freshman	12.5	12.0
2. Sophomore	47.5	44.0
3. Junior	22.5	10.0
4. Senior	7.5	4.0
5. Running Start	5.0	12.0
6. Other	2.5	14.0

Do you intend to complete an undergraduate degree in computer science or a closely related area?

	142	143
1. Yes	55.0	72.0
2. No	27.5	2.0
3. Don't know	17.5	16.0

What is your highest educational level?

	142	143
1. Some high school	5.0	12.0
2. High school degree or GED	15.0	8.0
3. Vocational education cert.		
4. Some college	35.0	50.0
5. Associate of Arts degree	40.0	10.0
6. Bachelor's degree	2.5	14.0
7. Grad/professional degree		

Are you a:

	142	143
1. full-time student	85.0	70.0
2. part-time student	12.5	24.0

APPENDIX D
Postcourse Questionnaire Response Summaries

STUDENT EXPERIENCES -- SUMMARY

CSE 142

WI00

The postcourse questionnaire administered to community college (CC) students was made up of questions taken from the standard course evaluation form administered to University of Washington (UW) CSE 142 classes, with the addition of a small set of items pertaining solely to the community college classes. The summary below is based on the responses of 25 CC students and 286 UW students enrolled in CSE 142 during winter quarter, 2000. The percentage of students choosing each response option is shown. Differences between CC and UW students were tested using one-way analysis of variance (items 1-13) or chi-square analysis (items 15 and 16, and those found to be significant have been marked (*= $p < .05$; **= $p < .01$; ***= $p < .001$).

		Excellent (6)	Very Good (5)	Good (4)	Fair (3)	Poor (2)	Very Poor (1)	Mean
1. The course as a whole was:	CC	8.0	40.0	28.0	24.0			3.4 ***
	UW	20.9	40.8	30.5	7.1	.4	.4	4.7
2. The course content was:	CC	4.0	32.0	36.0	20.0	8.0		4.0 ***
	UW	18.5	45.9	29.9	5.0		.7	4.8
3. Amount you learned in the course was:	CC	12.0	20.0	24.0	24.0	12.0	8.0	3.7 ***
	UW	31.1	35.0	22.5	8.2	1.8	1.4	4.8
4. Relevance and usefulness of course content were:	CC	12.5	29.2	37.5	16.7	4.2		4.3 *
	UW	28.0	38.0	23.3	7.9	1.4	1.4	4.8
5. Evaluative and grading techniques (tests, papers, projects, etc.) were:	CC	4.0	12.0	24.0	44.0	16.0		3.4 ***
	UW	11.8	33.6	30.7	15.4	7.1	1.4	4.2
6. Reasonableness of assigned work was:	CC	12.0	12.0	32.0	28.0	12.0	4.0	3.7
	UW	12.5	23.9	33.2	19.6	6.8	3.9	4.0
7. Clarity of student responsibilities and requirements was:	CC	8.0	16.0	16.0	44.0	16.0		3.6 ***
	UW	18.2	25.7	35.0	15.4	5.0	.7	4.4
8. Technical quality of the videos was:	CC	24.0	12.0	40.0	20.0	4.0		4.3
9. Availability of resources required to complete course assignments was:	CC	8.3	20.8	25.0	25.0	12.5	8.3	3.6

Relative to other college courses you have taken:

		Much Higher (7) (6)		Average (5) (4) (3)			Much Lower (2) (1)		Mean
10. Do you expect your grade in this course to be:	CC	4.2	8.3	20.8	20.8	4.2	16.7	25.0	3.4 **
	UW	7.2	17.3	19.1	29.9	12.2	8.6	5.8	4.3
11. The intellectual challenge presented was:	CC	12.5	45.8	16.7	8.3	8.3	8.3		5.2
	UW	24.4	40.9	19.4	9.7	4.7	.7	.4	5.7
12. The amount of effort you put into this course was:	CC	16.7	33.3	20.8	16.7	8.3	4.2		5.2
	UW	29.0	32.6	18.6	15.1	3.9	.7		5.7
13. The amount of effort to succeed in this course was:	CC	29.2	33.3	8.3	20.8	4.2	4.2		5.5
	UW	32.7	32.4	17.3	11.5	4.0	1.4	.7	5.7
14. Your involvement in this course (doing assignments, attending classes, etc.) was:	CC	16.7	29.2	29.2	16.7	4.2	4.2		5.3
	UW	31.8	27.8	22.4	14.4	2.9	.7		5.7

15. On average, how many hours per week have you spend on this course including attending classes, doing readings, reviewing notes, writing papers and any other course related work?

		<2	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-21	22+
	CC			4.0	8.0	16.0	20.0	8.0	12.0	8.0	12.0	4.0	8.0
	UW	.4	1.1	2.6	9.6	15.1	17.3	14.3	12.1	10.3	4.0	3.3	9.9

16. From the total average hours above, how many do you consider were valuable in advance your education?

		<2	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-21	22+
	CC	8.3	12.5	25.0	16.7	4.2	12.5		12.5	4.2			4.2
	UW	2.5	4.0	13.7	16.5	18.0	16.5	7.2	7.9	5.4	1.8	2.9	3.6

		Yes	No
17. Did your class experience any technical problems in viewing the course material?	CC	80.0	20.0
If you did experience such problems, did they interfere with your learning?	CC	61.9	38.1
18. Did you enjoy the teaching format used in this course?	CC	37.5	62.5
Would you recommend it to a friend?	CC	36.4	63.6

19. What is your class level?

CC	Freshman	16.0
	Sophomore	48.0
	Junior	4.0
	Senior	4.0
	Running Start	20.0
	Other	8.0

20. What is your highest educational level?

CC	Some high school	8.3
	HS degree or GED	12.5
	Vocational education certificate	
	Some college	66.7
	Associate of arts degree	8.3
	Bachelor's degree	4.2
	Graduate/professional degree	

STUDENT EXPERIENCES -- SUMMARY

CSE 142 and CSe 143

SP00

The postcourse questionnaire administered to community college (CC) students was made up of questions taken from the standard course evaluation form administered to University of Washington (UW) CSE 142 classes, with the addition of a small set of items pertaining solely to the community college classes. The summary below is based on the responses of 20 CSE 142 students and 34 CSE 143 students enrolled in the TVI format during spring quarter, 2000. The percentage of students choosing each response option is shown. Differences between CSE 142 and 143 students were tested using t-tests (items 1-14) or chi-square analysis (items 15 and 16, and those found to be significant have been marked (*= $p < .05$)).

	Excellent (6)	Very Good (5)	Good (4)	Fair (3)	Poor (2)	Very Poor (1)	Mean
1. The course as a whole was:	142 6.3	43.8	37.5	12.5			4.44*
	143	2.9	20.6	39.4	38.2	8.8	2.71
2. The course content was:		12.5	62.5	12.5	12.5		3.75*
	143		11.8	32.4	35.3	20.6	2.35
3. Amount you learned in the course was:	142 6.3	18.8	50.0	6.3	18.8		3.88*
	143	2.9	8.8	20.6	41.2	26.5	2.21
4. Relevance and usefulness of course content were:		50.0	25.0	12.5	12.5		4.13*
	143		12.1	18.2	45.5	24.2	2.18
5. Evaluative and grading techniques (tests, papers, projects, etc.) were:	142 18.8	25.0	18.8	37.5			4.25
	143 3.0	15.2	30.0	24.2	18.2	9.1	3.33
6. Reasonableness of assigned work was:	142 31.3	18.8	43.8	6.3			4.75*
	143	3.0	27.3	33.3	24.2	12.1	2.85
7. Clarity of student responsibilities and requirements was:	142 25.0	6.3	25.0	37.5	6.3		4.06*
	143	3.0	12.1	42.4	21.2	21.2	2.55
8. Technical quality of the videos was:	142 6.7		33.3	13.3	20.0	26.7	2.08
	143 8.8	11.8	29.4	23.5	23.5	2.9	3.50
9. Availability of resources required to complete course assignments was:	142		12.5	12.5	56.3	18.8	2.19*
	143 15.2	12.1	33.3	24.2	15.2		3.88

Relative to other college courses you have taken:

	Much Higher (7) (6)		Average (5) (4) (3)			Much Lower (2) (1)		Mean					
10. Do you expect your grade in this course to be:	142	37.5	12.5	18.8	18.8	6.3	6.3	5.38					
	143	3.0	15.2	15.2	33.3	9.1	21.2	3.0	3.94				
11. The intellectual challenge presented was:	142		13.3		13.3	13.3	26.7	33.3	2.60				
	143				12.1	27.3	45.5	15.2	2.36				
12. The amount of effort you put into this course was:	142		6.3		18.8	25.0	50.0	1.87					
	143	3.0	3.0	3.0	15.2	45.5	30.0	2.12					
13. The amount of effort to succeed in this course was:	142	6.7		13.3			26.7	53.3	2.20				
	143			3.0	9.1	39.4	45.5	1.79					
14. Your involvement in this course (doing assignments, attending classes, etc.) was:	142		6.3		12.5	12.5	37.5	31.3	2.31				
	143				9.7	19.4	35.5	35.5	2.03				
15. On average, how many hours per week have you spend on this course including attending classes, doing readings, reviewing notes, writing papers and any other course related work?		<2	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-21	22+
	142				6.3	6.3	6.3	18.8	6.3	12.5		31.3	
	143			3.0	3.0	15.2	6.1	15.2	12.1	9.1	6.1	3.0	
16. From the total average hours above, how many do you consider were valuable in advance your education?		<2	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-21	22+
	142							6.7	6.7	6.7			
	143			3.2	16.1	6.5	12.9		9.7	22.6	3.2		25.8

	Yes	No
17. Did your class experience any technical problems in viewing the course material?	142 55.0	10.0*
	143 67.6	32.4
If you did experience such problems, did they interfere with your learning?	142 50.0	20.0
	143 32.4	44.1
18. Did you enjoy the teaching format used in this course?	142 20.0	60.0
	143 47.1	38.2
Would you recommend it to a friend?	142 20.0	55.0
	143 41.2	47.1

19. What is your class level?

142	Freshman	26.7
	Sophomore	53.3
	Junior	
	Senior	
	Running Start	13.3
	Other	6.70

143	Freshman	18.8
	Sophomore	31.3
	Junior	18.9
	Senior	3.1
	Running Start	21.9
	Other	6.3

20. What is your highest educational level?

142	Some high school	
	HS degree or GED	6.7
	Vocational education certificate	
	Some college	66.7
	Associate of arts degree	13.3
	Bachelor's degree	13.3
	Graduate/professional degree	

143	Some high school	
	HS degree or GED	15.6
	Vocational education certificate	
	Some college	53.1
	Associate of arts degree	15.6
	Bachelor's degree	15.6
	Graduate/professional degree	

APPENDIX E
Tables and Figures

Table 1. Average test scores and course grades in CSE 142 by institution (Winter 2000) *

		Midterm 1	Midterm 2 **	Final ***	Grade in course ***
UW Standard	Mean	53.6	42.3	89.3	2.8
	N	431	430	431	363
	SD	22.70	24.49	54.61	.99
UW High Prep	Mean	53.5	44.1	88.5	2.9
	N	58	58	58	46
	SD	25.42	28.63	61.04	1.04
UW Low Prep	Mean	50.4	43.6	91.2	2.7
	N	87	87	87	77
	SD	21.24	21.91	46.56	.90
Centralia	Mean	64.5	42.5	95.0	2.9
	N	2	2	2	2
	SD	14.85	16.26	11.31	.71
Green River	Mean	43.1	22.4	40.5	1.2
	N	29	29	29	29
	SD	23.11	24.03	56.95	1.37
Shoreline	Mean	52.7	44.5	95.1	2.4
	N	24	24	24	24
	SD	23.69	22.18	60.26	1.39
Total	Mean	52.7	41.8	87.5	2.7
	N	631	630	631	541
	SD	22.86	24.73	55.26	1.09

* Designation of UW course sections as 'high preparation' or 'low preparation' was based on student academic background.

** Site means were found to be significantly different ($p < .01$) using one-way analysis of variance.

*** Site means were found to be significantly different ($p < .001$) using one-way analysis of variance.