Internet-based Courses at Atkinson College: An Initial Assessment

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Background

Towards the end of 1998, The Centre for the Study of Computers in Education was contracted by the office of the Dean, Atkinson College to analyze and report on data relating to a) student performance in its Internet-based course offerings relative to its other courses and b) student experiences with and perceptions about online courses. The data available consisted of student final grades for all Atkinson courses and (for the Internet-based courses only) student responses to an online course evaluation form. In the report that follows, a separate analysis each of these two data sets is first presented, and then the results from both are synthesized and some recommendations offered for enhancing the quality of Atkinson's online course offerings.

Student performance in Internet-based courses

Design of the Analysis

 In order to compare student performance in the three course modes which Atkinson offers (Internet-based, correspondence, and in-class), student grades for Internet-based courses held between fall 1996 and fall 1998 were compared to grades for the same set of courses offered in either or both of the other two modes. Only those internet-based courses which a section or sections taught in other modes were considered in the analysis in order to minimize mean grade differences between the modal groupings that might be attributable to course differences independent of mode effects. Appendix 1 provides the full list of courses and sections identified by course mode used in the analysis, the number of students in each section, and for Internet-based courses the environment or course developer used for the section. Each student's final letter grade was converted to a grade point scale using the conversion table below (see Table 1). This table reflects York University's conversion standards and was provided by Wendy Busby of the Information Management department.

Table1
Student grade Conversion

Letter Grade	Scale Value
A+	9.0

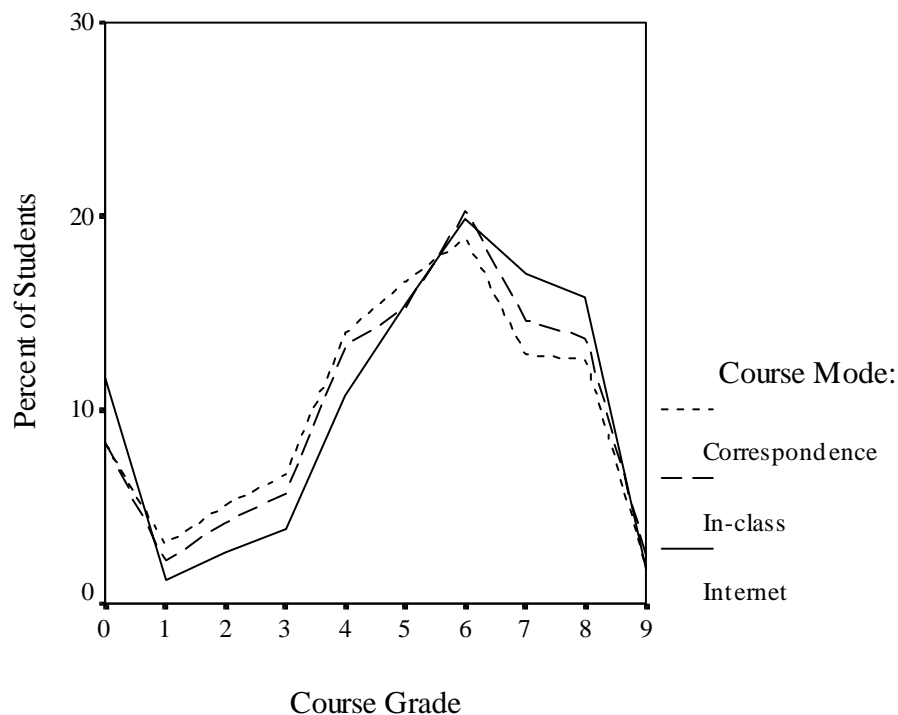|	
A	8.0
A-	7.5
B+	7.0
B	6.0
B-	5.5
C+	5.0
C	4.0
C-	3.5
D+	3.0
D	2.0
E	1.0
F	0.0

An analysis of variance was conducted on the data using SPSS 9.0, taking course mode as the grouping variable and student grade as the outcome (dependent) variable. The large sample size for each course mode ensured robustness of the ANOVA relative to assumptions of normality of the sampling distribution of means and homogeneity of grade variance across cells given the relatively equal sample sizes for each mode and the nearly equal standard deviations of grades for each mode (see Table 2).

Table 2
Descriptive Statistics: Course Grade by mode

Course Mode	Mean	Std. Deviation	N
Correspondence	4.94	2.36	2318
In-class	5.13	2.36	2467
Internet	5.19	2.48	1099
Total	5.07	2.39	5884

Analysis Results

Figure 1 provides a graphical representation of student grade distributions by course mode.

The ANOVA analysis revealed significant differences between the three course modes ($F(2,5881) = 5.618$, $p<.005$). The estimated marginal means were identical to the observed means (see Table 2). Post-hoc tests (employing the Bonferroni correction for inflated Type 1 error due to multiple comparisons) indicated that the mean grade for the Internet mode courses was significantly higher than that for the correspondence courses ($p<.005$) and that the in-class course mean grade was also greater than the correspondence course mean grade ($p<.01$). No significant difference was found between the Internet and in-class course mean grades.

Subsequent discussion with the Management Information office at York indicated that virtually all of the students given a grade of zero had not taken the final exam - that a zero grade was in effect a code for "did not finish course" (although further steps would have to be taken by the student to have the grade expunged from his or her transcript). In order to examine the relative performance across modes for those students that did truly complete the course, a second analysis was carried out in which all students with grades of zero were removed from consideration. The descriptive statistics for this analysis are shown in Table 3.

Table 3
Descriptive Statistics: Course Grade

Course Mode	Mean	Std. Deviation	N
Correspondence	5.39	1.92	2127
In-class	5.60	1.86	2262
Internet	5.88	1.72	971
Total	5.57	1.87	5360

Once again significant differences between modes of delivery were found in student grades ($F(2,5357) = 23.856$, $p<.0005$). Post-hoc tests indicated that the mean grades for all three modes differed significantly from each other ($p<.001$ for all tests), with the Internet mode group having the highest average grade and the correspondence mode group the lowest - an observed difference of .49 on the 10 point scale. The estimated means were identical to theobserved means.

Student Course Evaluations

The evaluation questionnaire used for both the summer and fall 1998 online courses is presented in Appendix 2. Table 4 gives the student completion rates by course for the online evaluation.

Table 4
Student Evaluations Completed

Course	N	% of class

ADMS1000	37	63
ADMS2400	23	26
ADMS3480	5	14
ADMS3920	26	25
EN3770	17	26
PHIL2075	13	20
PSYC2410	17	28
SOSC3720	29	36
Total	177	

Given the low number of respondents - both in absolute terms and as a proportion of the overall class sizes - inferential statistical comparisons between classes were not considered appropriate. Instead, the data were aggregated across classes so that a more general analysis of students' responses to online courses could be conducted. Table 5 gives the means and standard deviations for all responses to the 22 quantitative ratings students completed in the evaluation (see Appendix 1 for the corresponding questions). Response distributions by rating category are provided in tables 3 through 5.

Table 4
Online Evaluation Responses: Summary Data

Question	Mean	Std. Deviation
Q1	3.6	1.1
Q2	4.0	1.1
Q3	3.6	1.2
Q4	3.8	.97
Q5	3.6	1.0
Q6	3.9	.97
Q7	3.7	1.2
Q8	3.6	1.2
Q9	3.6	1.0
Q10	3.8	1.0
Q11	4.2	.85
Q12	3.2	1.2
Q13	3.5	1.2
Q14	3.7	1.1
Q15	3.6	1.3
Q16	3.5	1.2
Q17	.67	.47
Q18	.77	.43
Q19	.44	.50
Q20	.26	.44
Q21	2.1	.67
Q22	1.8	.63

Table 5
Online Evaluation Responses, Questions 1 to 16: Response Distribution (% of total)

	Very Poor	Poor	Average	Good	Very Good
Q1	4	8	20	45	24

Q2	1	9	30	35	25
Q3	3	10	24	33	30
Q4	3	10	31	38	19
Q5	2	11	34	37	16
Q6	3	7	20	46	24
Q7	5	13	24	36	23
Q8	5	9	27	40	19
Q9	2	7	30	43	18
Q10	2	5	29	41	23
Q11	1	3	17	38	42
Q12	7	17	31	28	16
Q13	9	13	32	25	22
Q14	2	10	26	35	27
Q15	7	14	29	26	25
Q16	4	13	29	31	23

Table 6
Online Evaluation Responses, Questions 17 to 20:
Response Distribution (% of total)

	No	Yes
Q17	32	68
Q18	27	73
Q19	60	40
Q20	75	25

Table 7
Online Evaluation Responses, Questions 21 to 22:
Response Distribution (% of total)

	Increased (Q21) / Requirement (Q22)	Equivalent (Q21) / Elective (Q22)	Decreased (Q21) / Other (Q22)
Q21	20	58	21
Q22	49	40	11

Of the 15 items rated on a five point Likert scale (Q1 to Q16), all but two received an average rating between "average" and "good", with the great majority of the means being closer to "good" than "average". Asked about the course coordinator's command and knowledge of the course material, students gave a mean rating slightly better than "good". The average rating for textbooks was "good". The lowest rating was given to the "usefulness of the CourseRoom on the Internet", which received a rating placing it just above "average" (3.2) All of the question responses showed a negatively skewed distribution, with proportionately very few "very poor" responses and fewer "poor" than "very good" responses (see Table 5). Overall, about 70% of those students responding felt the online course they were taking to be of average or better than average quality on the rated dimensions, with between 44 % and 80% rating it as either "good" or "very good". The response to question 10, which asked students to rate the overall course, had an average response just below "good" (3.8), with only 7% considering their course "poor" or "very poor". Taken together, these results suggest a fairly high level of satisfaction with the online course, relative to other traditional courses taken. Table 6 indicates that 68% of respondents felt that the course stimulated their interest in taking further courses in the discipline, and 73% said

that they would recommend the course to their friends. But these students did not generally feel that they had learned any more (or less) as a result of taking the course in online form (Table 7, Q 21).

Forty percent of the students indicated that "the distance format" was their "only alternative for academic study this session". As this question makes no distinction between the online and correspondence distance formats, it is not clear what percentage of these students were limited to choosing the online section only. The course taken was a requirement of the degree program for 49% of those responding. Asked in an open-ended question why they had taken the course instead of a traditional lecture-based section, 49% cited the convenience that the online course format afforded them in terms of their schedule, allowing them the flexibility to study at times that can accommodate the demands of their work and/or family responsibilities. One quarter indicated that the format allowed them to save time, primarily by eliminating the need to commute to York on a regular basis for classes. Fourteen percent stated that they had no other choice but this section if they wanted to take the course, sometimes because the regular course section created a timetabling conflict, or because the regular section was fully enrolled. Two students cited reduced costs, through the elimination of parking and travel.

Relatively few students made any mention of any potential pedagogical advantages of online learning. Six indicated that they had enrolled in the course because it allowed them to work at their own pace; four indicated a general interest in trying something new; and three said they took the course because they "enjoyed the Internet". One student had taken it on the recommendation of a friend; another indicated that he wanted to compare how well he learned in this new format with his experiences in other courses.

Suggested Revisions

Student responses were much more varied when they were asked what they would like to see revised about the course. Many of their comments addressed the same aspects of the courses that are typically responded to in any course evaluation, such as the quality of the text or the fairness of tests and examinations; these will not be reviewed here as they are not pertinent to a consideration of the course format *per se*. As roughly parallel suggestions were made by students in each of the four Administrative Studies courses, these are summarized together; then the comments for the other classes are reviewed.[1]

Administrative Studies. The most common complaint focussed on the quality of the online asynchronous discussion groups in which the students participated. In ADMS 3920, three students remarked that the discussion groups were poorly organized. The physical layout of the discussion threads onscreen was considered weak by a few students, who suggested alternatives:

> Discussion group postings should be listed with the most recent entries at the top of the page - scrolling takes to much time, also it took almost a week before I realized that there were notes other than the first two, and as a result I almost missed my participation question.

> More organized discussion groups.(Although this is not the fault of the professor but of students that do not pay attention to instructions.) If possible some way for students to be able to mark which comments they have already read and delete

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[1] To preserve the nuances of student expression, all quotes are verbatim – grammatical errors etc. have not been corrected.

those that they feel are irrelevant, or have a place were they can drag relevant comments for future quick reference.

The substantive elements of the discussion also caused a few concerns. There was a feeling that more guidance was needed in shaping the interchanges:

I found the discussion forum to be of limited value. Rather than stimulating thought, as would be the case in a regular classroom, the discussion forum was too artificial.

There are a lot of comments posted in the Discussion area that are not appropriate. I believe that the professor should delete them.

Try and encourage better use of the on-line discussion group. It's a very valuable tool, but could be made more effective by encouraging students to interact more (in other words, in my opinion, it's not being used to its full potential). Perhaps offering some participation marks for critiquing others' work, offering general insights into the course content, etc. would help achieve this.

I found the format of the online participation completely wasteful. I got so bored about the course room after the 4th lecture that I decided not to participate. The current format where students respond to stock questions gives rise to 30-100 postings per lecture, that are repetitive and right out uninformative. This is hardly intellectual interaction, and rarely goes beyond waste of time, and I am being generous. The equivalent to this model would be students standing up in class one by one and presenting their "opinions" on the same set of questions. Imagine... who would stand for that? Also there is a 10% mark for participation in this mindless exercise. Please, this is a university not kindergarten. If marks are now awarded then the format should truly focus on participants quality interaction not on their ability to post to the opinion board.

One student felt that given the extensive amount of time put into reading and posting in the discussions groups the 10% of the grade assigned to that activity should be increased, with less weight given to the exams. The length of the online lectures received a few criticisms, for example:

I would restructure the course so that there wouldn't be as much of an information overload as I experience. Given that the professor didn't face any time constraints, it permitted him to talk on end.

Another element that received comment from several students was the use of case studies in the ADMS courses. These were thought to be poorly explained, and the quality of feedback received for case study work was felt by several participants to be inadequate:

Because we've never had any feedback on case material I will have no idea exactly what the Prof. expects from us on the exam.

A little more time explaining cases and case studies is needed.

One of the courses provided videotapes of lectures rather than delivering them online, and this was not considered appropriate by several students, one of whom asked for interactive online

video. The audio quality of the videotape was judged unacceptable by a few students who could barely hear the professor and never heard student questions.

Several students made heated comments about the surcharge for an online course; they saw no legitimate reason why it should cost any more than a regular course since many of the physical resources utilized in regular classes were not being used.

Technical problems were mentioned by several respondents (although it must be kept in mind that this group constituted a small percentage of all the ADMS students). One student stated that the "RealPlayer" slide presentation did not work well on my computer or many others. There has to be another way to facilitate the multimedia portion. I ended up using audio throughout the course." Another had a similar experience:

> Technical difficulties have been a major disappointment. For instance, my real-player 'crashed' numerous times while listening to the lectures. Also, there were transmission problems ad the sound would just stop. I would then have to start from the beginning. I found this very frustrating and time consuming. As a result I was discouraged from listening to the lecture material.

English 3770. The critiques and suggestions for improvement from this class were generally the most forcefully presented. Of the 16 students responding, 11 cited technical problems, and nine thought that the level of technical support they had received was inadequate. These two issues were typically intertwined in their comments. The following excerpts highlight the typical issues raised by this group:

> Perhaps a few less students because it was obvious that after more students enrolled or got on-line, the feedback for each of us decreased somewhat. I was able to negotiate my way around the program, but it was obvious that some students couldn't. Perhaps either a bit more in-depth instruction regarding how to negotiate around in the course room as well as instructing students how to label their discussions

> There should be more assistance for students with this type of learning program. I found the people at the Distance Learning Centre totally useless with any course questions I had. The Steacie Lab monitors were just slightly better with assistance. Where is a student supposed to get help? The course coordinators expect you to already know the program. I would like to see this course offered in the traditional lecture fashion unless some radical changes are made to guide people through it. Once I learned the program, I still had difficulty getting prompt/effective feedback for my work.

> The technical help for the internet is almost criminal! I spent $800 on this course and after several attempts, I gave up in frustration in trying to connect to the VCR. Thus I was unable to join in on discussions or share my work. My only contact was the Prof. who was extremely accommodating. Why not use some of the money York is getting from Pepsi to increase their technical staff ???

A few students offered some specific suggestions about how to address these problems:

> Have at least two classes at the university that would allow an in depth explanation of the course and how to use the internet for the course etc. Then a second meeting to clear up any other problems that may exist. They should

remember that not everyone is comfortable to just "do it" on the net without some help and guidance.

When student enrolling ask which browser they have and send appropriate instruction sheets. When student enrolling ask the level of knowledge as well as experience with internet in order to better assist students--don't just leave them trying to find out who to contact and trying to figure out what questions ought to be asked of a technical person. Better instructions of how to print out materials while in LearningSpace. Give a list of contacts who can actually answer questions knowledgeably. Give out some basic how-to instructions about LearningSpace i.e. how to attach stuff to email to professor/TA; what to do when Error #s appear; give some basic how-to instructions re chat rooms.

Several of the students had a negative assessment of their interactions with the course TA. They had complaints about the TA's failure to respond to queries and assignments, and problems with her assessments:

I'd like to see tutors who are a) Available at only one e-mail address, so they're readily accessible. b) On the same continent as we are for the duration of the course, so they can be contacted and a reply received quickly. c)whose ISP's are reliable enough that assignments and comments are not lost in cyberspace. (Keeping to one ISP usually helps!!!) d) In tune with the final product that the professor is trying to achieve, and not so wrapped up in what they would like to see and in what they would like to change. e) Not the only individuals responsible for grading. Many grades were lost in cyberspace, many assignments were given a grade projection, and then received an actual grade which was much lower than the projection. Tutors need to mean what they say when they tell a student what level they're working at, so that any improvements that are necessary can be made, and so that the student doesn't have a false sense of security re: their marks. The professor needs to rein in his T/A a lot. Our Tutor was given too much freedom in the final portfolios, and we found that expressing ourselves through writing was difficult, and that we were only writing to please her, to play the game and get the final marks.

TEACHING ASSISTANTS. These people are just that - assistants. They should not be allowed to think that they are the professors. They can not be solely responsible for my mark. I DO NOT believe, for even a moment, that the course director reviewed my material; however, upon asking the TA about this she informed me that I could talk to the Prof.; however, she pretty much guaranteed me a lower mark forcing me to hold my tongue…. [The TA] lost and misplaced, ALL of my assignments causing great stress in my life. I felt as though I would not receive anything back and I would fail due to lack of comments. In fact, many students were put behind and left begging for extensions due to lack of returned material. I am still waiting for my final portfolio. Others complained of having marks but no comments.

Also - make sure the TA is sympathetic to university students, qualified and available to work out the bugs before putting a full classroom on line; make sure each student gets personal attention on a heavily regular basis. In fact, I feel that this course was ruined for a lot of people because of the choice of TA and also

because it relied so heavily on peer evaluation to the detriment of regular, detailed, personal one-on-one attention to the students from the course directors.

A concern about the cost of the course was raised by several students. One student said, expressing a common view, "since there's no actual lecture, no University facility is being used, and not many materials, there could be consideration of making distance courses a lot less expensive". There was a strong feeling that the course should not be subject to extra surcharges.

One student expressed a concern that the course was simply not suited to on-line teaching because an in-class format would provide more opportunities for interacting with other students and responding to their writing and comments.

Phil*osophy 2075.* Few students expressed concerns or offered suggestions for improvement for this course. Of the ten responding to the evaluation, two were critical of the instructor's online communications:

> I was extremely disappointed with the instructor's ability to communicate clearly the requirements of the assignments, with the time it took for her to give feedback, or answer questions, and with her level of mastery of the course material.

> [Have] more direct contact via email (it was often difficult to get in touch with the instructor or receive adequate info on the question at hand).

Of the remaining comments, most centered on substantive aspects of the course independent of the delivery mode (the textbook, the exams, etc.). Two students cited a need for more discussion; two the need for faster feedback from the instructor; and one mentioned missing hyperlinks and slow grading.

Psychology 2410. Only one of the criticisms made concerned the mode of course delivery - one student indicated that sometimes the view of the discussions database was confusing. There were a few students who indicated that the marker's comments on assignments were lacking in quality, and a desire was expressed by two students to have assignments and essays handed or mailed back.

Sociology 3720. Of the 26 students responding, four could not suggest any improvements. Several respondents stated that they found the reading load too heavy. A need to improve the student-instructor contact was cited by four respondents. Two mentioned specific problems they encountered in this regard:

> There should be better one on one communication via the student and teacher. I was unable to send essays over the computer due to computer problems that were no fault of my own and received very few comments on how to improve my essays. I was disappointed when my emails for help and comments were not responded to.

> Better communication between Prof. and student. I am still waiting for an answer from the Prof. whom I e-mailed in July twice. More clear instructions on assignments.

Two students felt that the course failed to take advantage of the potential of the Internet for course delivery:

> There was little or no use made of the unique facilities afforded by the Internet. The course notes could just as easily have been mailed out. Class was indistinguishable from a traditional correspondence course.

> Make the medium more inter-active. Using Lotus Notes as a delivery mechanism is very limiting. This course was more of a correspondence course than an internet course. The internet offers interactive capabilities. York should investigate what is being done in computer based training (CBT). This is the third distance learning course I have completed and I much preferred the method used in ADMS 3270.

Two other students were of the opinion that the online mode for this course was inferior to the traditional delivery method:

> Personally, I think on-line courses do not provide the learning opportunity that an in-class course gives. However, I'm happy that on-line courses are available for people that share circumstances similar to my own.

> The course was pretty interesting. Although, I think the course would have been better if it was a lecture based course, considering the type of issues that were being discussed.

The quality of discussion between students and with the professor, and means for improving it, were addressed by two respondents:

> I think that internet discussion groups should be graded this would increase participation in the course discussions. I personally enjoy interaction with others and found this to be limited in this course

> An actual chat room in the Learning Space would be helpful. Each professor could construct a schedule to deal with specific topics, along with "open" time so students could ask questions, etc. about anything. There could be no participation marks, because many students have schedules that wouldn't allow them to be online at certain times of the day. However, with most chatrooms, one is able to scroll back over the last X messages in order to read the conversation.

There were two comments reflecting technical problems using the online mode: one student had difficulty attaching files to online documents, and a second had several problems:

> Access to information should be improved. I got my package the day the course started. It was not clear how to actually access the course: i.e. register on line for it once I was enrolled. I never got replies from the Help Centre when I e-mailed. I had good communication via e-mail with the professor but felt it was not a welcome way to communicate. I could not access the program due to last minute changes and upgrading at York and so found that extremely frustrating. Eugene was very helpful eventually when I got his number through screaming over the phone at someone. There needs to be more staff in the distance education office if you are going to maintain or expand the service.

Perceived course strengths

Students were asked to list "as many items as you liked about the course." As responses varied by course, replies for each course will be examined separately. Once again, the focus will be on responses that reflect on the character of the online delivery mode of the course.

Administrative Studies 3920. Seven students made favourable comments about the ease of access to course materials and activities the online format made possible. Respondents liked being able to view lectures whenever they desired and at their own pace, and a few mentioned that they valued the option of repeated viewings. Two noted that the use of the RealPlayer delivery system for lectures made them more enjoyable.

The use of multimedia elements was lauded by several students. As one put it, "There are a lot of graphics and other kinds of tool to make the audio lecture more interesting and easy to understand." Two students cited the value of the PowerPoint slides. The course's audio and video notes were also praised by a few respondents.

Two other dimensions of relevance here were cited by a few respondents: the high standard of course organization and presentation, and the value of the discussion group.

Administrative Studies 3480. The few comments received for this course (only five students completed an evaluation) mentioned the quality of the course's organization. One student liked the use of RealPlayer for content delivery.

Administrative Studies 2400. Six of the students in this course cited the convenience that the online mode offered in terms of scheduling study time and permitting repeated viewings of content. Several of these respondents explicitly mentioned not being required to attend on-campus lectures at a specific time as being a key benefit of the online mode.

The second major element to receive praise was the use of online discussion groups. Three students mentioned that they thought they were helpful, especially as a means of assisting each other in clarifying the business cases they were assigned and working towards their solution.

A few other aspects of the course were considered beneficial by one or two students, including the quality of feedback given to student work by the professor, and the use of videotapes for lecture delivery.

Administrative Studies 1000. Once again the convenience of being able to study when desired and at one's own pace received the greatest number of comments (5). Also valued were the online discussions (3 comments). Two students offered an explanation of their utility:

> I feel that the discussion forum was a very informative aspect of the course. It helped with the learning process as well as an insight into what my class mates were thinking. The discussion forum was also a great way to get feed back.
>
> The discussion group gives me a chance to learn about different ideas from my classmates. It is not even possible in the classroom because of the usual size of it.

The use of the audio forma for online lecture delivery was cited as valuable by five students, and six mentioned the value of the multimedia adjuncts to the lectures which some cited as contributing to their understanding of the material. The breakdown of the lectures into modules was considered helpful by a few students.

English 3770. Certain elements cited got praise by these students were the same as those mentioned by respondents in other courses. The convenience factor was cited by four students, and the quality of the comments and feedback from the professor and/or TA by three others. The online discussion groups were considered valuable by several students, but for slightly different reasons: in this class, they provided a forum that allowed other students to read and comment back on a student's composition, which was felt to be a significant benefit. One student said "I liked the interaction of students which I feel was stimulated in a unique and enjoyable way over an Internet forum ". Another commented on the effect this interaction had: "you know, ironically, this is such an impersonal way of learning, yet I felt closer to them [fellow students] than to most "in class" courses I have taken".

Certain other cited strengths were unique to this creative writing course. The online writing coach was singled out for praise by several students. And three mentioned the value of anonymity that the online format made possible. As one student put it:

> I also liked the fact that for those of us who are shy or conscious about the way we look, had a chance to "speak" up about how we felt, and how we felt about other people's writing.

Philosophy 2075. Most of the comments for this course related to the quality of the course content and structure, and the text. Three students did cite the convenience of the online learning mode, and there were individual comments about receiving assignments back quickly and getting helpful support from the distance education centre at Atkinson.

Psychology 2410. The flexibility and convenience of the online format was once again its most cited strength. One student noted that the course taught him self-discipline "which is a very important trait to have". Working independently at one's own pace received two mentions, as did the speed and quality of feedback from the professor. Two respondents highlighted the design and layout of the "internet classroom", and one made some revealing comments about the value of the discussion group:

> I really liked being able to talk to my classmates and my instructor at any given time. Everything was at the tip of my fingers and I felt confident that I was very much a part of the class. In Lecture based classes I have always felt intimidated, and insecure when it came to asking questions. Not only do you have the instructor's help, you also have your classmates. There is no embarrassing conversations, like those of a tutorial. It is important that they further internet usage because it has changed my view of school and has made learning fun, as well as educational.

Sociology 3720. The most commonly praised aspect of this course was the rapid speed and (to a lesser extent) high quality of the professor's responses to student work. Seven of the 29 students cited one or both of these factors. The flexibility/convenience dimension was mentioned by five respondents, and the ease of submitting assignments online by two. Areas receiving individual comment included learning about the Internet, getting feedback from other students in CourseRoom discussions, and the ability to see all of the course assignments ahead of time. One student made an interesting observation about his experience with this mode of learning:

[It is] very self directed which has its advantages as well as disadvantages. For an adult learner and professional this encourages professional accountability for ongoing growth and development the course material supported this.

Discussion and Recommendations

For the Atkinson courses included in the analysis, the mean student grade for online mode sections was as high as that for in-class sections and reliably higher than that for the traditional correspondence sections. When only those students who took the final exam were considered, the online mode average grade was significantly higher than either the in-class or correspondence mode average grades. For these students, then, and for these courses, it would appear at first glance that distance education was more effective when it was implemented on-line than when it was conducted by means of traditional correspondence delivery mechanisms, and that was also more effective than in-class teaching when those not completing the course requirements were eliminated from consideration.

Any inferences about causation or generalization of these findings beyond the studied courses and students can only be very tentative, however. Students were not randomly assigned to the different course modes, and there may be a range of student characteristics capable of influencing student grades for which self-selection into any of the three course modes might be a proxy. To take but one example, more able or motivated students may be more likely to have computers, be more knowledgeable about their use, and be more willing to try a new form of course delivery that has unknown risks and requires computer competence. Any higher grades they obtain in online courses could simply be a consequence of their greater ability or motivation rather than an indication of any pedagogical advantages to learning online. Only a randomized field experiment could fully eliminate these potential confounds. Continued investigation using a quasi-experimental approach does seem warranted, however, as it is very likely that over the next few years the ownership and use of personal computers by university students will become virtually ubiquitous, reducing the strength of many of these potential self-selection confounds.

The evaluation data from the online course must also be viewed with some caution, due to the relatively low return rates for the courses (refer to Table 1 above). However both the broad distribution of the ratings (see Table 3) and the balance between positive and negative assessments offered in the open-ended questions suggests that no non-random reporting bias arising from receiving evaluations from only those with favourable views (or vice-versa) exists in the data. If we make the working assumption that the responses given are reasonably representative of those from the online students as a whole, there would seem to be some grounds for inferring that the grade differences uncovered in the quantitative analysis do reflect the pedagogical strengths of the online approach to some extent. Had students' reported experiences of the online courses been strongly negative despite their better grades, it would be reasonable to suppose that self-selection was presenting a serious confound to any causal analysis – any reduction in grades due to the weaker pedagogy of the online mode (assumed to be reflected in the negative assessments) would have been reversed by the influence of the online learner characteristics mentioned earlier . But in fact the opposite appears to be the case here. All aspects of the courses received mean ratings lying between "average" and "good", including the clarity of instructional/directional information, the effectiveness of the on-line course lecture notes, the effectiveness of the student's Internet experience, the usefulness of the "CourseRoom" and email consultation, the quality of feedback and grading, and the quality of the overall communication from professors and TAs. The mean rating given to "overall rating for the course" was 3.8, just shy of "good". And while many students offered criticisms of certain aspects of their courses, there were approximately as many strengths as weaknesses cited in the open-ended questions. Overall, these students appeared generally satisfied with their course experiences, rating them better than average, which suggests that the slightly higher grades received by the online students may be an indication of a modest pedagogical superiority for the online format as it has been implemented at Atkinson to date.

Online Courses: Critical Dimensions of Student Experience

Qualitative analysis of the responses to the open-ended questions regarding what was liked about the course and what should be revised brought to light several commonly cited factors central to students' assessments of the strengths and weaknesses of their online learning – factors that appear to be at the core of what their experience leads them to feel are necessary conditions for effective study using this new mode. Some are identical to those common to more traditional course modes, such as quality and relevance of the text and readings, the "fairness" of the exams and assignments, the quality of grading, and the clarity of criteria for grading. Of the others, some are unique to the online learning mode while the rest receive a greater or reoriented emphasis in this mode: these, and their implications for enhancing the online learning experience, are discussed below.

Student – Faculty Interaction. Students addressed many of their comments, both positive and negative, to the quality, frequency, and timeliness of faculty and TA responses to inquiries for information and clarification about lecture content, case material, assignments, essay and exam requirements, and so on. They appreciated prompt email responses to requests for assistance, and expressed concern when these were not forthcoming. The speed and quality of feedback received for graded work was also mentioned frequently. In some instances, especially in the English course, it was felt that the TA was not providing adequate and/or fair feedback and that the faculty member responsible for the course needed to be more active in overseeing the TA's activities and participating in direct exchanges with students. Some marking was critiqued as lacking specificity and not being useful in improving future work. It is clear from their comments that students consider the level of personal attention they receive from TAs and faculty to be a critical component in their assessment of course quality, and faculty leading an online course must be prepared to devote time to monitoring TA – student online interactions and taking appropriate steps when problems emerge. Professors should consider having a scheduled "online office hours" period every week so that students with questions or concerns could initiate a real-time discussion about them. Alternatively, as one student suggested, specific topics might be chosen for scheduled faculty – student or TA – student synchronous dialogs.

Procedural and Technical Support. There was a considerable degree of variation across courses in the extent and severity of procedural and technical problems students encountered, with those in the English class experiencing the greatest difficulty and those in the Administration courses reporting the lowest frequency of problems. (This pattern may simply reflect a greater level of computer proficiency amongst Administration students, many of whom use computers on a day to day basis at work.) Several students found the technical or procedural support personnel available to them (either via the Distance Learning Centre at Atkinson, or the Help Desk at CCS) to be sorely lacking in their ability to solve the difficulties encountered. Students need to know how, when, and where to get the support they needed for different types of problems. Course leaders should provide printed documentation covering all aspects of the steps for connection, registration, and navigation and use of the course space well in advance of the start date so students can ensure that they have resolved technical problems and mastered operational procedures before they become immersed in the course's workload. Instructions should provide guidance in resolving the most commonly encountered problems, and should either provide support for multiple platforms and browsers or make clear in their registration materials that a computer having a certain minimal specification and using a certain Web browser is a requirement for participation. Serious consideration should be given to providing an initial hands-on workshop at a campus computer lab at the beginning of the online course to train students in operational procedures and provide a course overview.

Online Discussion Groups. Many respondents considered the discussion groups to be a major strength of their course. They valued being able to engage in exchanges with their cohorts about readings, cases, assignments, and exams, both to clarify aspects of course content and to gain an understanding of other students' ideas and perspectives. Several others, however, saw shortcomings in the ways that discussion groups were being implemented that detracted (to a greater or lesser degree) from their utility. Software tools that allow students to select and organize different views of discussion groups and threads, and to highlight, save and delete posted items are needed to assist students in managing large amounts of online discussion in ways that can best foster collaborative knowledge building. Consideration should be given to breaking up larger classes into several independent discussion groups in order to reduce volume and encourage participation, and either a TA or the instructor needs to assume an active role as the "discussion mentor" so as to maximize the potential of the discussion to contribute to course objectives and avoid repetitive, non-interactive or off-topic posts. Where the course director considers the discussion to be a major component of his or her pedagogy, this needs to reflected in the grading weight given to the quantity and quality of student participation.

Course Design. This dimension received less comment than the others, with only a few students in each class mentioning aspects of the course design that they thought strong or weak. (The one exception was the Admin Studies 1000 course; a number of these students praised the audio lectures and multimedia adjuncts provided.) Several comments were made in support of the use of multimedia elements (diagrams, illustrations, RealPlayer audio) within the course, although it appeared that the RealPlayer technology for audio and especially video playback did offer technical problems for a few users. Multimedia elements were thought to enliven presentations, and to make lectures more interesting and understandable when used appropriately. Two students criticized the Sociology course for failing to make use of the interactive and multimedia potential of the Internet and saw it as just another correspondence course. Scattered general praise was given to various courses for the course's organization or presentation.

Students are beginning to expect that a Web-based course provide more than just online lecture notes, reading lists, and assignments. Instructors need to think through their educational strategies and consider how the media delivery systems and interactivity the Internet affords can best be used to enhance student engagement in the discipline and promote desired learning outcomes. At the same time, they must keep in mind the limited throughputs available to most student users and the wide range of computer models students are using – building a complex course environment with many multimedia components that is optimized for a fast computer with a cable modem or ASDL connection can only lead to student frustration.

Conclusion

The Atkinson students who took online, Internet-based courses did as well as students taking the same set of courses in class and better than those enrolled in the traditional correspondence versions of those same courses. When only those students taking the final exams are considered, their performance was better than that of the in-class students as well. (What is not clear is why there was a slightly higher percentage of students from the online sections who did not complete the final exam.) Given the high statistical significance of these differences across course modes, it is highly probable that they will hold for the entire population of Atkinson courses provided the courses not considered here have the roughly the same distribution of relevant attributes as the ones that were. Precisely what the relevant attributes are cannot be determined from the existing data – this would require an extensive set of field experiments (as well as a review of the extant research literature on correspondence and class-based higher education). However, the comments made by students in their evaluations offer an indication of the dimensions to which they give the

most subjective weight, and these are very likely to correlate with student performance. At the very least they appear to be strong determinants of student satisfaction with their course experience, and for this reason alone the factors discussed above require careful attention during course design and implementation.

It bears repeating that on the basis of the limited data available and how it has been obtained, attributions of causality for the outcome differences across modes can only be preliminary and tentative. While we have offered a rationale for discounting potential self-selection effects based on the students' reporting of their experiences, they cannot be entirely eliminated as a possible confound. Still, the weight of the evidence suggests that on average courses delivered via the Internet are no less pedagogically sound than those presented more traditionally, and that as a means of providing distance education they may have a slight but significant positive impact on student gardes comapred to standard correspondence courses. Of course, the content and design of Internet-based courses continues to evolve at a very rapid pace. The current findings are likely to be relevant for a few years at best. Ongoing comparative assessments will be necessary for faculty and administrators to be accurately informed about the efficacy of the courses currently being offered.

Appendix 1

Atkinson Courses Used in Grade Analysis

Ak/ Adms 1000 3.0 Q Introduction to Business

Internet:
1) Ak/ Adms 1000 3.0Q / S98-SU / 59 students / Captus Press

Correspondence:
1) Ak/Adms 1000 3.0 Z / F97-W98 - W / 112 students
2) Ak/Adms 1000 3.0 Z / F97-W98 - F / 114 students
3) Ak/Adms 1000 3.0 Z / S 97- A2 / 94 students

In class:
1) Ak/Adms 1000 3.0 A / S 98 SU / 102 students
2) Ak/Adms 1000 3.0 B /S 98 SU / 117 students
3) Ak/Adms 1000 3.0 C / S 98 S1 / 109 students

Ak/ Adms 2400 3.0 Q Introduction to Organizational Behaviour

Internet:
1) Ak/ Adms 2400 3.0Q / S98-SU / 52 students / Captus Press
2) Ak/ Adms 2400 3.0Q / F97-W98- W / 45 students / Captus Press
3) Ak/ Adms 2400 3.0Q / F97-W98- F / 36 students / Captus Press

Correspondence:
1) Ak/ Adms 2400 3.0Z / F97-W98-W / 99 students
2) Ak/ Adms 2400 3.0Z / F97-W98-F / 123 students
3) Ak/ Adms 2400 3.0Z /S97- A2 / 50 students

In class:
1) Ak/ Adms 2400 3.0A / S98-SU / 72 students
2) Ak/ Adms 2400 3.0B / S98-SU / 78 students
3) Ak/ Adms 2400 3.0C / F97-W98-W / 67 students

Ak/ Adms 2500 3.0 Q Introduction to Financial Accounting

Internet:
1) Ak/ Adms 2500 3.0Q / S98-SU / 57 students / Learning Space
2) Ak/ Adms 2500 3.0Q / F97-W98- W /54 students / Learning Space

Correspondence:
1) Ak/ Adms 2500 3.0Z / F97-W98 - F / 78 students
2) Ak/ Adms 2500 3.0Z /S97-A2 /42 students
3) Ak/ Adms 2500 3.0Z / F96-W97 - W / 36 students

In class:
1) Ak/ Adms 2500 3.0A / S98-SU / 107 students

2) Ak/ Adms 2500 3.0B / S98-SU / 126 students
3) Ak/ Adms 2500 3.0 B/ F97-W98- W / 340 students

Ak/ Adms 3480 3.0 Q Human Resources Management

Internet:
1) Ak/ Adms 3480 3.0Q / F97-W98-W / 35 students / Captus Press
2) Ak/ Adms 3480 3.0Q / F97-W98-F / 29 students / Captus Press
3) Ak/ Adms 3480 3.0Q / SU97- A2 / 16 students / Captus Press

Correspondence:
1) Ak/ Adms 3480 3.0Z / S98- SU / 83 students
2) Ak/ Adms 3480 3.0Z / F97-W98-W / 120 students
3) Ak/ Adms 3480 3.0Z / F97-W98-F / 122 students

In Class:
1) Ak/ Adms 3480 3.0C /F97-W98- W /137 students
2) Ak/ Adms 3480 3.0D /F97-W98- W /130 students
3) Ak/ Adms 3480 3.0T /F97-W98- W /24 students

Ak/ En 3770 6.0 Q Creative Writing

Internet:
1) Ak/ En 3770 6.0Q / S98-SU / 65 students / Learning Space
2) Ak/ En 3770 6.0Q / S97-SU / 55 students /Greenlight Communications

Correspondence:
None

In class:
1) Ak/ En 3770 6.0A / S96 - S / 36 students
2) Ak/ En 3770 6.0A / F93-W94 Y /31 students
3) Ak/ En 3770 6.0B /F92-W93 Y / 30 students

Ak/ Hist 2210 6.0 Q History of Canada

Internet:
1) Ak/ Hist 2210 6.0Q / S97- N2 / 21 students / Greenlight Communications
2) Ak/ Hist 2420 6.0Q / F96-W97 Y / 14 students / Greenlight Communications

Correspondence:
1) Ak/ Hist 2210 6.0Z / S98- SU / 119 students
2) Ak/ Hist 2420 6.0Z / F95- N / 53 students

In class:
1) Ak/ Hist 2210 6.0A / F97-W98 Y / 41 students
2) Ak/ Hist 2420 6.0A / S95- N / 53 students
3) Ak/ Hist 2420 6.0A / F94 - W95 Y / 30 students

Ak/ Musi 2500 3.0 Q Elementary Musicianship

Internet:
1) Ak/ Musi 2500 3.0Q / F96-W97-W / 32 students / Greenlight Communications

Correspondence:
1) Ak/ Musi 2500 3.0Z / F96-W97-F / 35 students
2) Ak/ Musi 2500 3.0Z / F95-W96- W / 25 students

In class:
1) Ak/ Musi 2500 3.0A / S96 - T / 27 students
2) Ak/ Musi 2500 3.0A / S95 - T / 27 students

Ak/ Nats 1790 6.0 Q Science and the Environment

Internet:
1) Ak/ Nats 1790 6.0Q / F97-W98-Y / 130 students / SynchronousCommunications

Correspondence:
None

In class:
1) Ak/ Nats 1790 6.0A / S98-SU / 63 students
2) Ak/ Nats 1790 6.0A / F96-W97 X /43 students
3) Ak/ Nats 1790 6.0B /F96-W97 X / 22 students

Ak/Psyc 2410 6.0 Q Introduction to Psychology

Internet:
1) Ak/Psyc 2410 6.0 Q / S98 SU / 61 students / Learning Space
2) Ak/Psyc 2410 6.0 Q / F97-W98 Y / 36 students / Learning Space
3) Ak/Psyc 2410 6.0 Q / S97 N2 / 14 students / Greenlight Communications

Correspondence:
1) Ak/Psyc 2410 6.0 Z / S98 SU / 215 students
2) Ak/Psyc 2410 6.0 Z / F97-W98 Y / 101 students
3) Ak/Psyc 2410 6.0 Z / S97 N2 / 112 students

In class:
1) Ak/Psyc 2410 6.0 A / S98 D1 / 89 students
2) Ak/Psyc 2410 6.0 B / S98 SU / 132 students
3) Ak/Psyc 2410 6.0 A / F97 - W98 Y / 84 students

Ak/Psyc 2510 3.0 Q Basic Statistical Methods

Internet:
1) Ak/Psyc 2510 3.0 Q / F97-W98 F / 20 students / Synchronous
Communications
2) Ak/Psyc 2510 3.0 Q / F96-W97 W / 22 students / Synchronous
Communications

Correspondence:
1) Ak/Psyc 2510 3.0 Z / F96-W97 F / 30 students

In class:
1) Ak/Psyc 2510 3.0 A / S98 I3 / 58 students
2) Ak/Psyc 2510 3.0 B / S98 S1 / 34 students
3) Ak/Psyc 2510 3.0 A / F97-W98 F / 41 students

Ak/Psyc 3140 3.0 Q Animal Behaviour

Internet:
1) Ak/Psyc 3140 3.0 Q / F97-W98 W / 83 students / Learning Space
2) Ak/Psyc 3140 3.0 Q / F96-W97 - F / 52 students / Greenlight
Communications

Correspondence:
1) Ak/Psyc 3140 3.0 Z / S96 R / 222 students
2) Ak/Psyc 3140 3.0 Z / F95-W96 - W / 165 students

In class:
1) Ak/Psyc 3140 3.0 A / F96-W97 - F / 33 students
2) Ak/Psyc 3140 3.0 A / S96 M2 / 71 students
3) Ak/Psyc 3140 3.0 A / F95-W96 - F / 39 students

Ak/Sosc 3720 6.0 Q Canadian Social Problems

Internet:
1) Ak/Sosc 3720 6.0 Q / S98 SU / 80 students / Learning Space

Correspondence:
1) Ak/Sosc 3720 6.0 Z / S97 SU / 187 students

In class:
1) Ak/Sosc 3720 6.0 A / S95 SU / 117 students
2) Ak/Sosc 3720 6.0 A / F91-W92 Y / 23 students
3) Ak/Sosc 3720 6.0 A / F90-W91 Y / 28 students