

Study Time Allocation of Medical Informatics
Distance Education Students

by

Katherine Anne Gorris

A THESIS

Presented to the Division of Medical Informatics and Outcomes Research
and the Oregon Health Sciences University

School of Medicine

in partial fulfillment of

the requirements for the degree of

Master of Science

May 2000

School of Medicine
Oregon Health Sciences University

CERTIFICATE OF APPROVAL

This is certify that the Master of Science thesis of
Katherine Anne Gorris
has been approved


Chair


Member


Member


Member



Associate Dean for Graduate Studies

Table of Contents

ACKNOWLEDGEMENTS	ii
ABSTRACT	iii
INTRODUCTION	1
OVERVIEW	1
BACKGROUND	3
<i>Adult Education</i>	3
<i>On-line Learning</i>	4
<i>MINF510D: Introduction to Medical Informatics On-line</i>	6
PURPOSE	8
RESEARCH QUESTIONS	9
METHODS	10
STUDY DESIGN	10
PARTICIPANTS	10
MEASUREMENT INSTRUMENTS	11
DATA COLLECTION.....	13
DATA ANALYSIS.....	13
RESULTS	15
BACKGROUND INFORMATION QUESTIONNAIRE.....	15
TIME ALLOCATION LOGS.....	17
<i>Graphs and Descriptive Statistics</i>	17
<i>Randomized Block ANOVA</i>	21
DISCUSSION	23
SUMMARY OF FINDINGS.....	23
IMPLICATIONS FOR FUTURE COURSE OFFERINGS	25
LIMITATIONS	27
FUTURE RESEARCH.....	28
CONCLUSION	29
REFERENCES	30
APPENDIX	32
DATA COLLECTION INSTRUMENTS	32
<i>Time Allocation Log</i>	32
<i>Background Information Questionnaire</i>	34

Acknowledgements

I would like to thank my advisor, Bill Hersh for his support and encouragement. The opportunities and challenges that he has presented to me have expanded my knowledge and experience.

I would also like to express my appreciation to my thesis committee members, Joan Ash and Bill Smith, for their patience and guidance.

Many thanks to Pat Tidmarsh who not only helped with the data collection for this study but also supported me as a great listener and friend.

To my family and Warren, your never-ending love and encouragement have kept me moving forward along the road that I have chosen to follow. I could not have done this without you.

Abstract

The goals of this study were to examine how medical informatics distance education students spent their study time on predefined study categories and to develop a profile of the time spent on various study categories in the process of completing the required course work. The profile is now available to both instructors and students as a resource for estimating both the time required to complete the course and the allocation of the time among study categories.

Participants in the study were volunteers from the winter 2000 quarter Introduction to Medical Informatics course at Oregon Health Sciences University. Eight of the 16 students in the course participated in this study. Participants of the study were asked to complete a time allocation log for each week of the course reporting the amount of time spent on each of the predefined study categories. A background information survey was also administered to gather demographic information. The collected time data were analyzed by looking at the distribution of reported times both across participants and across weeks of the course.

The results of the study demonstrate that the time students spend on coursework and the allocation of this time among the predefined study categories vary greatly between students. While significant differences did exist between the students, the individual students remained consistent in their study habits over weeks 5-8 of the course. Time spent during weeks 9 and 10 varied greatly from the earlier weeks with the students

spending large amounts of time on their term papers and final exams. Since the mean total time spent per week for most students either falls within or slightly below the suggested 9 – 12 hours per week for a 3-credit course, the study also suggests that the distance students are spending an appropriate amount of time on coursework.

Introduction

Overview

Medical informatics is the rapidly growing multidisciplinary field incorporating information technology with health care. Several formal training programs in medical informatics have emerged to meet the need for individuals who understand not only the current information technology available but also the intricacies of handling medical information. However, the demand for formally trained medical informatics individuals currently exceeds the supply (Greenes & Shortliffe, 1990). Medical informatics education must continue to expand and adapt to the changing needs of the field.

As with most multidisciplinary fields, the individuals gravitating toward the available training programs demonstrate a wide variety of backgrounds. Previous educational training in medicine, engineering, computer science, and biology is common (Patton & Gardner, 1999). They are typically professionals with established careers who have been exposed to the opportunities and challenges of medical informatics through their work. Some seek full-time formal training; others desire part-time coursework to accommodate others demands on their time, including work and family. Flexibility in training is often essential.

To meet the increasing demand for flexible medical informatics training, Oregon Health Sciences University (OHSU) has started developing on-line coursework based on its Master of Science in Medical Informatics degree program with the goal of offering a

Certificate in Medical Informatics program beginning in Fall 2000. The Certificate program will be positioned to provide a broad understanding of the many elements within medical informatics. The characteristics of this program allow professionals to enhance their knowledge and skills without committing to a degree program that would likely require relocation and/or other significant lifestyle changes. The Web-based format of the courses offers a learning experience that is independent of time and location. Limited only by access to the Internet, the on-line courses provide interested individuals with the opportunity to pursue medical informatics training in a more flexible setting.

OHSU initiated its on-line medical informatics training with two pilot courses. In the current quarter, spring 2000, both Introduction to Medical Informatics and Information Retrieval are available. Introduction to Medical Informatics was also offered previously in the fall 1999 and winter 2000 quarters. During the pilot offerings, 40 students from the United States, Canada, and New Zealand have participated in one or both of the on-line courses. The feedback from these students has indicated general satisfaction with pilot course offerings and enthusiasm for future courses. However, further evaluation of the student experience with the on-line courses is required to ensure that they continue meet the needs of the students.

Background

An understanding of issues related to adult education, the online learning format, and the specific course examined are necessary to frame this study. Since the students in the course studied were adults in established careers and lifestyles, the reintroduction of coursework to their routines was likely a significant change. An understanding of the factors encouraging and hindering adult education outlines some of the challenges that may have been faced by the students. Online learning was new experience for the study participants and the course staff. Since online learning is an emerging method of instruction, examining the current state of the format as well as possible future directions is necessary. The final piece in framing this study is offering an overview of the course used for this study. Since the results of this study may have been influenced by the content and structure of the course studied, an introduction to the course materials and workflow is included to offer a glimpse into the student experience with the course.

Adult Education

Adult education can be encouraged by many different factors. In studying the motivational forces on post-certification coursework among nurses, both personal and professional motives were identified (Dowswell, et al., 1998). The main personal motives identified include the need to make up for missing out on coursework or fill in gaps in their training. These motives were tied to improving individual self-esteem. On the professional side, the main forces included the need to complete specific coursework for job advancement and pressure from their work environment to increase their qualifications.

Conversely, many barriers to adult education have been identified. Hezel and Dirr (1990) interviewed 100 students in television based courses, asking them to comment on the barriers to enrolling in courses. Their responses indicated that time was the largest barrier. Balancing the time required for their coursework with that of their other obligations, including work and family, was reported as the most significant difficulty. In examining the study habits of adult college students, Hogan and Hendrickson (1984) reported that household tasks, family obligations, lack of motivation, and work schedule were the main obstacles in studying for their courses. Ellsworth's (1991) survey of over 1,200 university students identified four similar deterrents, lack of confidence, family responsibilities, institutional encouragement, and time.

On-line Learning

Web-based distance learning has been offered as a solution to overcome these obstacles to participation in coursework by allowing for greater flexibility in how and when the students learn (Digilio, 1998). On-line education has expanded greatly over the last few years to meet the demands of students for more flexible learning.

“A few years ago, only a handful of schools offered cyber-degrees; today, more than a third of U.S. colleges do ... E-college is shaping up as a way to attract those who might not otherwise get a degree, especially older students with jobs and families who value the flexibility Internet classes offer.” (Eggen, 2000).

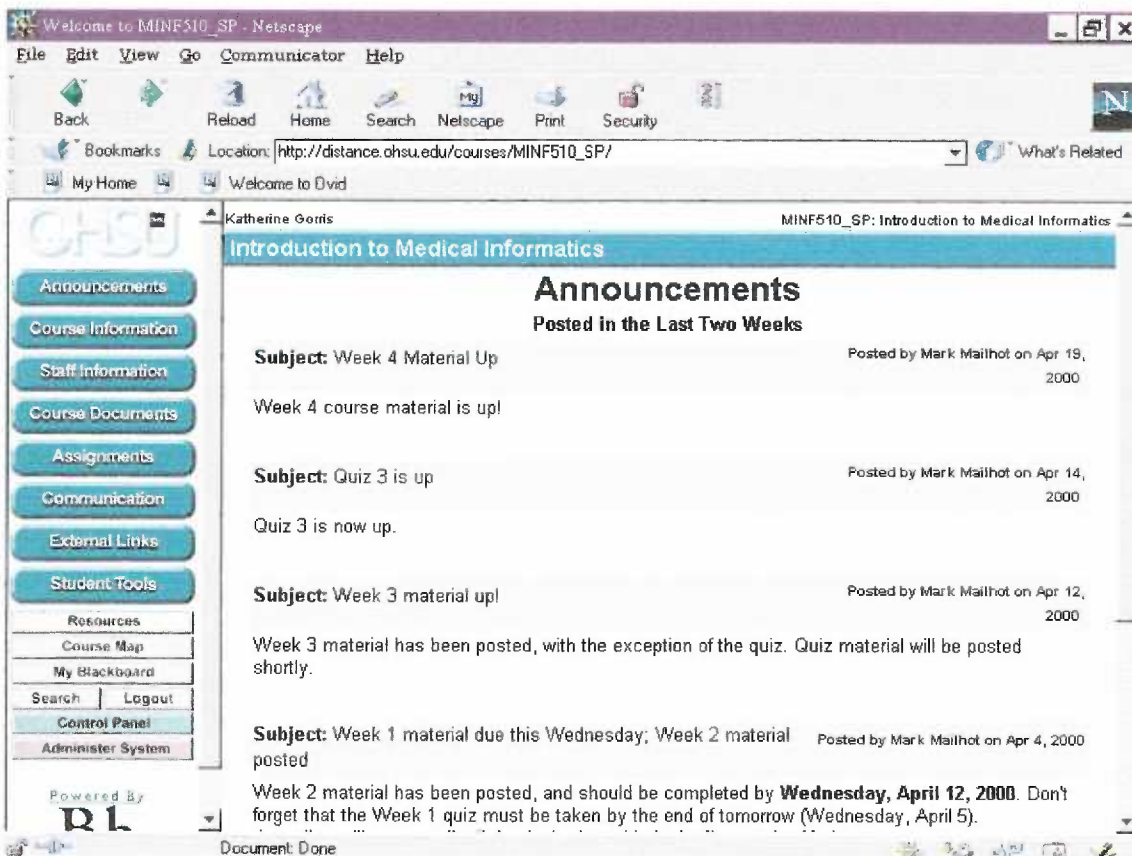
In the health care arena, Web-based has become a prevalent tool for supplementing traditional training. Computerized tools currently available to medical students include drill and practice tools, tutorials, models, and interactive simulations (MacKenzie & Greenes, 1997). Internet-based delivery of continuing education materials has also become prevalent in nursing (Cariton, 1997) and medicine (Sikorski and Peters, 1998).

While Internet based education has grown quite popular throughout the United States, very few evaluation studies have been conducted. In an examination of Medline citations, Campbell and Johnson (1999) discovered that most literature on computer aided learning focused on the technological aspects of project development and implementation. In the few studies that evaluate computer-aided learning, comparisons of computer-based coursework to the traditional lecture based classroom experience have been addressed. The two main issues that have been researched include comparing the time to complete the coursework and grades. In Gifford's (1998) examination of the time to complete the course requirements, graduate students indicated that Internet courses actually take more time to complete the basic course requirements than traditional classroom courses. A study conducted at California State University, Northridge, compared the grades of students in Web-based and traditional classroom offerings of a Social Statistics course (Schutte, 2000). The students in the Web-based offering scored an average of 20% better than the students in the classroom-based offering on identical midterm and final exams.

MINF510D: Introduction to Medical Informatics On-line

This study was conducted using students from the winter 2000 quarter offering of Introduction to Medical Informatics on-line. The course offered an overview of medical informatics to professionals with diverse backgrounds. The materials for this course included textbook and other readings, lecture notes created by the instructor, and lecture videos. Also included were discussion questions to be addressed on the course discussion board and weekly quizzes. The course content was posted weekly on the course site using Blackboard CourseInfo 3.0™ software. All course materials were adapted from the

Figure 1: Screenshot of Introduction to Medical Informatics Course Site



on-site course in the Master of Science degree program. Grading for the class was based on weekly quiz scores (1/3), a 10 –15 page term paper (1/3), and the final exam (1/3). The students were urged to use all materials presented on a weekly basis even though only the quizzes, paper, and final exam would determine their course grade.

Purpose

The majority of the students who have participated in the online courses have been employed full-time while completing the coursework. Thus, managing time for the courses while meeting the demands of their jobs and personal lives can be a major issue for these students. The goal of this study was to examine the time required to complete the coursework and the allocation of this time among predefined study categories.

Recognizing the importance of time issues for the students, this study served as a first step to understanding the student experience with the courses. By measuring the actual amount of time spent as reported by the students, we are now able to provide current and future students with a more accurate estimation of the amount of time needed to complete the course. In addition, the data collected provided the course instructor with a profile of how the students chose to spend their time among the various study categories. The time profile observed in this study may serve as a basis for modifying course content and/or required activities for this course and future courses.

Research Questions

This study examined the following research questions:

Main Questions

1. What is the distribution of the total time spent on study activities among the students?
2. What is the distribution of the total time spent on study activities across the weeks of the course?
3. What is the amount of total time per week spent on study activities?
4. What is the distribution of time spent on each of eight predefined study category among the students?
5. What is the distribution of time spent on each study category across the weeks of the course?

Secondary Questions

6. How does the mean total time spent per week compare to the 9 –12 hours per week recommended for a 3 credits of independent study for students in the Medical Informatics Master of Science program at OHSU?
7. What is the percentage of time spent during weeks 5-10 of the course on each of the study categories?

Methods

Study Design

This study was conducted as a cohort study of medical informatics distance learning students. It examined the amount of study time allocated among predefined categories during weeks five through ten of a ten-week web-based course. Participants completed weekly logs reporting the amount of time spent on each of the study categories. In addition to the weekly logs, participants also completed a survey with questions regarding demographic information and their previous experience with distance learning.

Participants

The study population of interest was the OHSU Medical Informatics Distance Learning students. At the time this study was conducted, only one course, Introduction to Medical Informatics, was offered by web-based distance learning. All 16 students enrolled in the winter 2000 quarter offering of this course were invited to participate in this study.

During the first week of the course, e-mail announcements and postings on the discussion board of the course site were made to encourage all students to participate in the study.

The announcements explained the purpose of the study and the expectations of participants. Students were reassured that participation in the study was an optional portion of the course and that precautions would be taken to minimize the influence of the study on the grading and treatment of students in the course.

A consent form approved by the Institutional Review Board at OHSU was mailed to all students. The consent form outlined the purpose, procedures, risks, and benefits of the study. By the end of the fourth week of the course, 9 students had agreed to participate in the study and submitted signed consent forms. One volunteer was excluded from participation in the study as he was auditing the course rather than taking it for credit. A demographic profile of the 8 participants and the non-participants was collected.

Measurement Instruments

The Time Allocation Log (Appendix) was created specifically for this study. The goal of this instrument was to provide defined categories in which the participants would record the amount of time spent on coursework each week. The definitions of the study categories used in the Time Allocation Log were empirically based. They were defined as exhaustive and mutually exclusive to ensure that the sum of the times reported in each category would be equivalent to the total time spent on coursework during the week. The category definitions are outlined in Figure 2.

The Time Allocation Log was pretested using students and teaching assistants from the fall 1999 quarter offering of the same course to ensure clarity in the definition of the categories and to verify that all activities could be classified into the study categories. The pretesting of the instrument resulted in modification of the instructions on the form. To increase the ease of recording times using the Time Allocation Log, participants were instructed to record their times to the nearest 5-minute interval.

Figure 2: Study Categories

Textbook - includes first time reading of the chapters as well as review. However, it does not include use of the textbook as a reference for such activities as completing homework assignments, conducting research for the term paper, or studying for and completing the final exam as the reading of the text is not the primary goal of the activity. This category also covers reading of supplementary reading materials assigned by the instructor such as journal articles.

Lecture outline/notes – includes reading and reviewing instructor generated lecture outline and any personal notes taken. It does not include time spent while using the outline or creating notes when viewing the video lectures since viewing the video is the primary activity.

Video lectures – includes not only the actual viewing of the video but also the time spent waiting for the videos to download.

Weekly quizzes – includes time spent searching for answers using any resources.

E-mail/discussion board – includes course-related use of electronic mail and use of the discussion board tool.

Chat – includes any use of the chat tool for real-time interaction with students and course staff.

Term paper – refers to all activities, including use of the textbook for research, conducted in the process of completing the term paper.

Final exam – includes reviewing the textbook, notes, video lectures, and all other course materials when reviewing for and completing the final exam is the primary goal.

Other – for activities not classified above. Time listed as other must include a description of the activity.

In addition to the weekly Time Allocation Log, the Background Information Questionnaire (Appendix A) was used to gather basic demographic information about the participants. Included in this survey were questions about previous experience with

distance learning or self-study coursework and Internet based coursework, as well as a question about when they last completed coursework for credit.

Data Collection

The Time Allocation Logs were collected on a weekly basis beginning in the fifth week of the ten-week course. For the purposes of this study, Thursday was defined as the beginning of the week and Wednesday as the end. These days were chosen because the new material for each week was generally posted late on Wednesday or early on Thursday with the assignments for the week due the following Wednesday. Participants were sent a reminder e-mail message at the end of each week urging the submission of the log for the previous week. The Background Information Questionnaire was sent to all participants with the reminder e-mail for the last week of the course.

The participants submitted their completed Time Allocation Logs and Background Information Questionnaire by e-mail to a neutral third party. The data was held by the third party until after the course grades had been submitted to the Registrar. This process was employed to reduce the chance of the study influencing the grading and/or treatment of students during the course.

Data Analysis

Five students submitted Time Allocation Logs for all six weeks of the study. The remaining 3 students submitted data for 5 of the 6 weeks. The missing data points for these students were replaced with the mean amount of time spent in each category over

the five weeks that were submitted. Other manipulation of the data included calculating the total time spent on coursework each week by adding the time values assigned to all activities for the given week and determining the percentage of time spent on each activity during weeks 5-10 of the course.

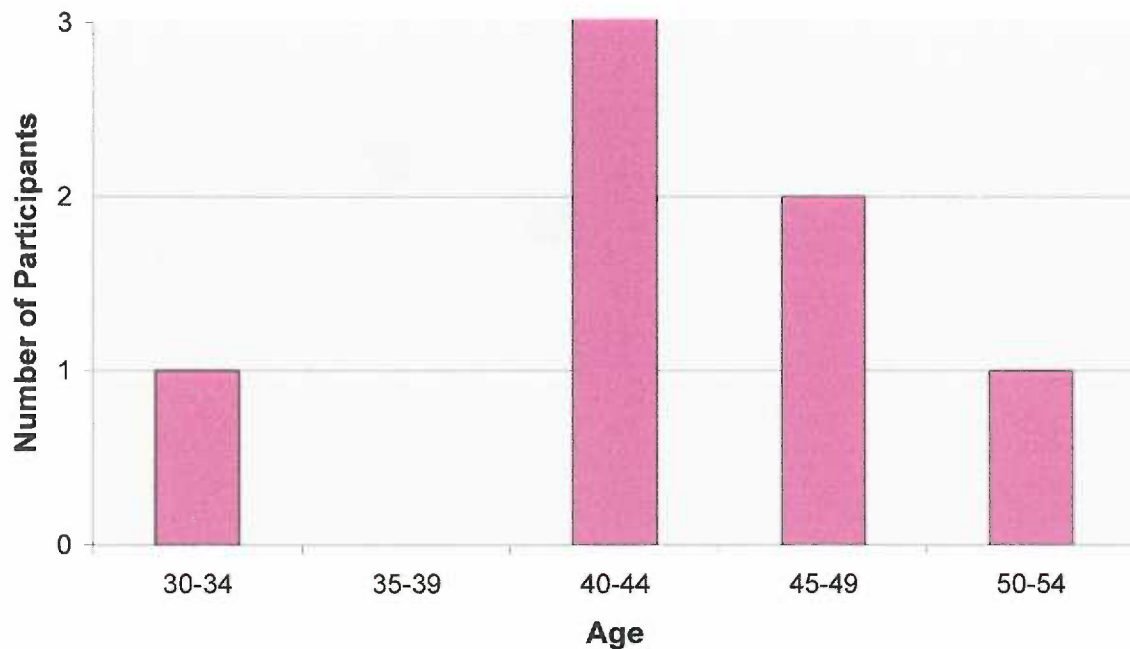
Descriptive statistics, including mean, median, and minimum and maximum values, along with graphing were used to obtain an overall impression of the data. In addition, randomized block ANOVA was used to address the proposed questions regarding the distributions of the data. The a priori significance level was set at 0.05. This specific test was chosen to account for the effects of the variation in the course materials by week and the variation in students. Both the descriptive statistics and the randomized block ANOVA were performed using SPSS Graduate Pack 10.0 (SPSS, Inc., Chicago, IL).

Results

Background Information Questionnaire

All eight participants completed and returned the Background Information Questionnaire. The age distribution of the participants is presented in Figure 3. Three were females; five were males. All indicated full-time employment status. Current employment titles included an administrative assistant, a medical librarian, and six physicians consisting of three internists, an endocrinologist, an attending psychiatrist, and an assistant professor of family medicine. Six participants listed MD as their highest degree with the one indicating a DMD and another a Masters degree. None of the participants had taken a

Figure 3: Participant Age



distance learning or self-study course before. Similarly, none had taken an Internet based course. The timing of the last course completed for credit included three in the 0-2 years category, two in the 3-6 years, and two in the more than 10 years.

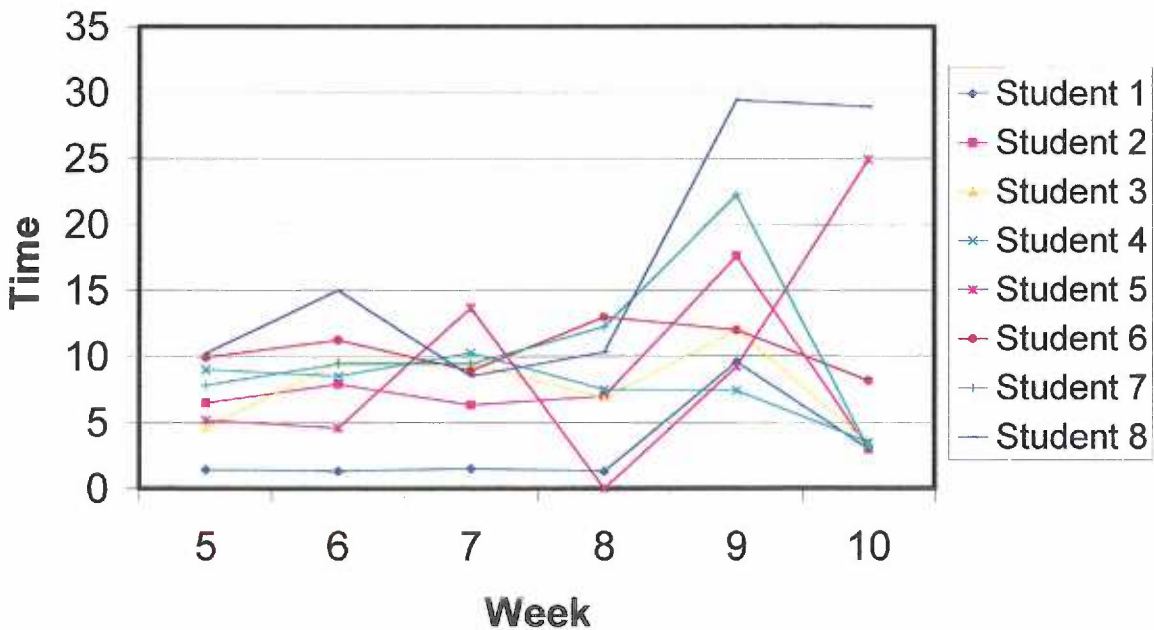
The known characteristics of the non-participants are gender and current position. For gender, the non-participants consisted of three females and five males. Their current positions included a law librarian/Masters student in information science, a medical librarian, a registered nurse, two emergency medicine physicians, a third year internal medicine resident, an internal medicine intern, and a third year medical student. Two of the non-participants, the male registered nurse and the male internal medicine intern, were auditing the course.

Time Allocation Logs

Graphs and Descriptive Statistics

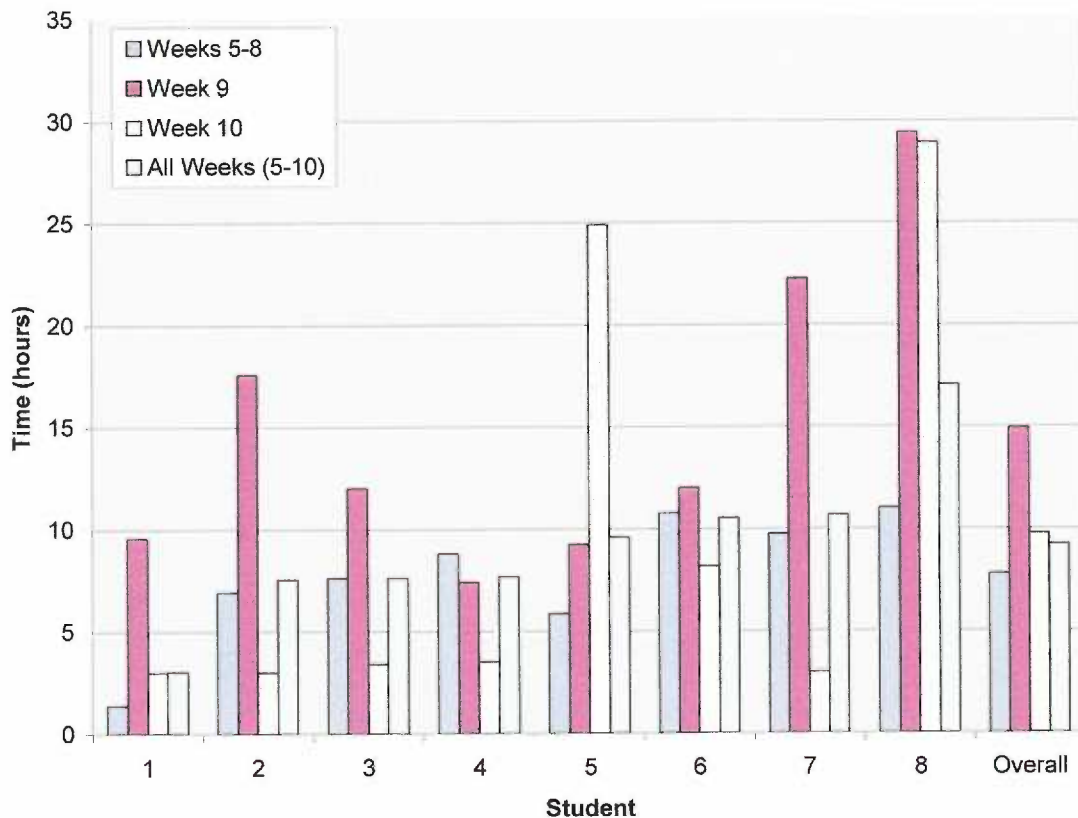
The graph of the total time per week by student (Figure 4) demonstrates several important pieces of information. First, the times reported by the students are fairly consistent for weeks 5-8 with a sharp rise during week 9. The times reported during weeks 9 and 10 varied from the previous weeks in that they included large amounts of time spent on term paper, which was due at the end of week 9, and the final exam, which was distributed and completed during week 10.

Figure 4: Total Coursework Time in Hours



The overall mean time spent on coursework (Figure 5) during weeks 5-10 of the course was 9.23 hours per week. The independent study guidelines for the Masters degree program suggested 9-12 hours of work for 3-credit hours. Thus the overall mean time spent on coursework during the last 6 weeks of the 10 week course met the suggested amount of work for the 3-credit course. Looking at the mean time spent on coursework for individual students, three participants demonstrated means within this suggested range. Two students indicated extreme values with one student spending a mean of 3.03 hours per week and the other spending a mean of 17.07 hours per week. The remaining 6 students are clustered in two areas with 3 students spending a mean of about 7.5 hours per week and 3 students spending a mean of 9.5 – 10.5 hours per week.

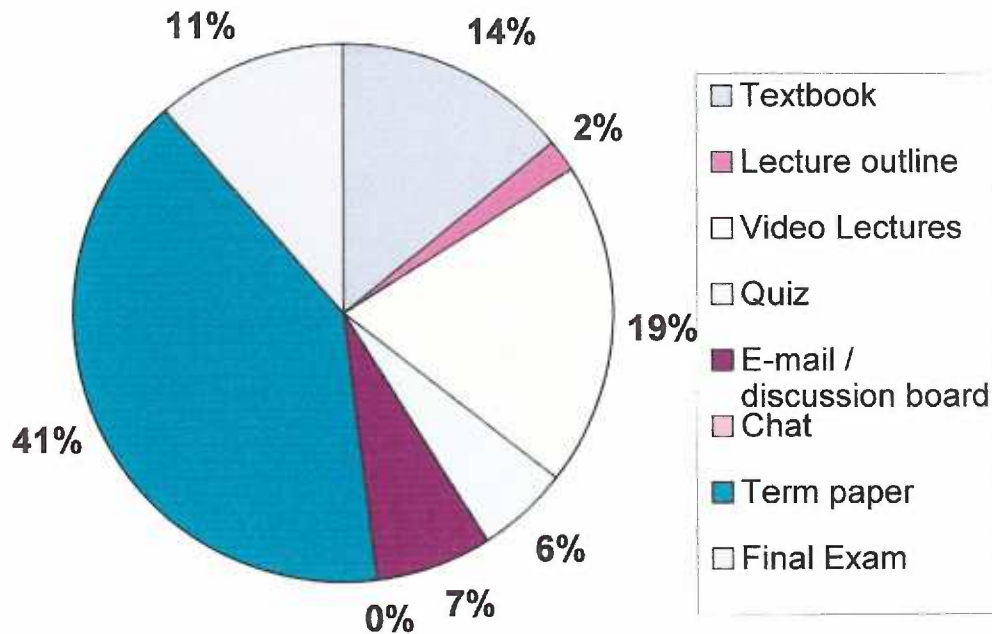
Figure 5: Mean Time on Coursework



The time patterns of the two students with extreme values do have possible explanations. Student 1 consistently spent less time on all areas of the course than the other students. In addition to the pattern of spending consistently less time than other students, the mean of 3.03 hours per week for Student 1 is skewed by the 8 hours spent on the term paper and 3 hours on the final exam. The median of 1.46 hours per week is a better indication of the average amount of time spent by Student 1. This participant's age differed significantly from the rest of the participants. His demographic information describes him as a 30-year-old staff physician, while all other participants fell between ages 43-54. While the exact cause of Student 1's study time habits cannot be determined with this information, his age may have had a direct or indirect influence on the amount of time spent on coursework.

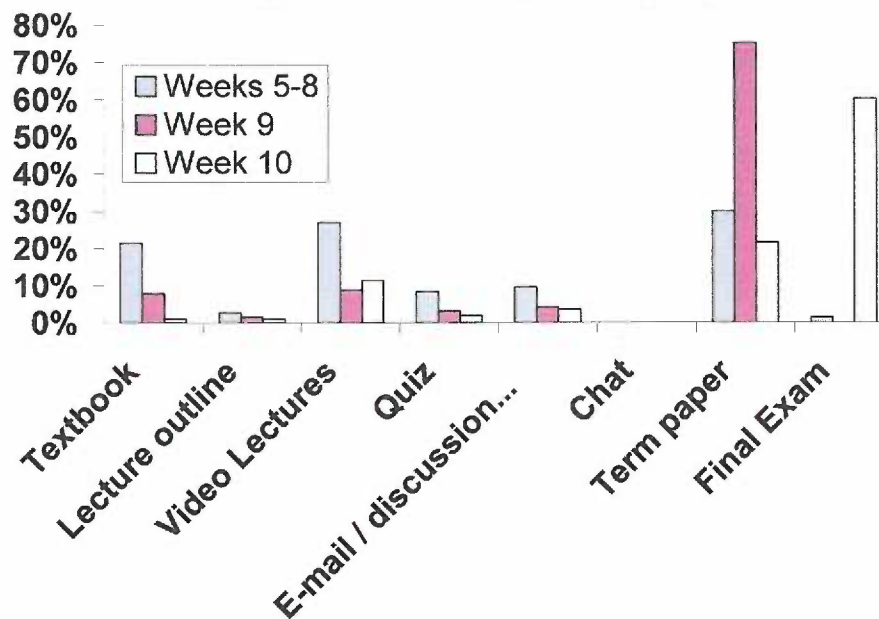
Student 8, whose mean time spent on coursework each week exceeded that of most other students, spent consistently more time on each category of coursework than most other participants did. In addition to consistently spending more time than the other students, the mean of 17.07 spent per week by Student 8 was skewed by the reported 40 hours spent on the term paper over the six weeks of the study and 21 hours on the final exam during the last week of the course. Of the 21 hours reported for the final exam, Student 8 indicated that at least 3.5 hours of this time was spent resolving technical difficulties related to opening and completing the exam. The median of 12.67 hours per week is a better indication of central tendency for the time spent per week by Student 8.

Figure 6: Time by Category - Overall



In examining each category over weeks 5-10 (Figure 6), 41% of the total time was spent working on the term paper. Watching the video lectures and reading the textbook followed behind the term paper in the percent of total time spent over the duration of the study. When the time is broken down into the categories of weeks 5-8, week 9, and week 10 (Figure 7), the effect of the term paper during week 9 and the final during week 10 is evident. During week 9, the term paper consumed 75% of the time spent. During week 10, the final exam absorbed 60% of the time spent.

Figure 7: Time by Category



Randomized Block ANOVA

For these tests, only the data for weeks 5-8 were used. The term paper during week 9 and the final exam during week 10 affected the amount of time spent on these categories as well as the other categories. As the term paper and the final exam dominated these last two weeks, the data from weeks 9 and 10 were excluded from the randomized block ANOVA.

This specific test was used to examine the distribution of the time measurements while accounting for the effects of the variation in the course materials by week and the variation in students. With the specific week set as the block to account for any variation in the material over the weeks of the course, the H_0 : There is no difference between individual students was tested. The a priori significance level was set at 0.05. The null hypothesis of no difference between students was rejected for all measures except the

time spent completing the weekly quizzes. These results indicated the variation in study time habits of the participants. The lack of difference in the time spent on the weekly quizzes was likely a function of their structure as a series of ten short multiple choice questions.

With the specific student used as the block to account for any variation in students, the H_0 : There is no difference between weeks in the course was tested. Again, the a priori significance level was set at 0.05. The null hypothesis of no difference between weeks was rejected for only the time spent using the lecture notes provided by the course instructor. Thus there was no significant difference between the weeks of the course in general. The irregularity in use of the lecture notes between weeks was likely a function of the category definitions. Any time using the lecture notes while watching the lecture videos was attributed to the lecture videos as watching the videos was the primary activity. Thus the time reported for the lecture notes category did not necessarily represent the time spent using the lecture notes.

Discussion

Summary of Findings

This study was conducted to examine the time required to complete the coursework in the Web-based offering of the Introduction to Medical Informatics course. The allocation of this time among predefined study categories was also investigated.

The demographic information collected from the study participants indicated a quite homogenous group. With the exception of one 30 year old physician, all participants subjects fell between the ages of 43-54. The perception that most students in the current on-line courses offered in medical informatics at OHSU are employed full-time was verified with the Background Information Questionnaire. All of the students declared full-time employment status with six of the students engaged as practicing physicians, a medical librarian, and an administrative assistant in a health care setting.

The evaluation of the mean time spent on coursework by week yielded quite predictable results. The means for Weeks 5-8 were similar, ranging from 6.84 to 8.51. Week 9, which concluded with the due date for the term paper, demonstrated a considerably higher mean of 14.94. Students spent a considerable amount of time on their term papers during Week 9. Specifically, four of the eight participants spent 10 or more hours on their term papers during this week. In Week 10, which included the final exam, students spent a mean of 9.36 hours on coursework. For this week, the mean is not the best measure of central tendency as it is skewed by Student 8's technical difficulties with the

final exam. Student 8 reported spending 21 hours on the final including the time consumed by her technical difficulties. Thus, the median of 3.46 hours is a better representation of the time spent on coursework during Week 10.

In the examination of the time spent on coursework as broken down into the predefined study categories, randomized block ANOVA was used to account for variation in the material across weeks 5-8 of the course and variations in students. Testing the null hypothesis that there is no difference between individual students resulted in rejection of the null hypothesis for all categories except the time spent completing the weekly quizzes. The weekly quizzes were a required part of the course for Weeks 1-9. Taking into account the multiple choice structure of the quizzes and the requirement of completing a quiz for each week, it is not surprising that the only category for which the students demonstrated no significant difference in time spent was for the weekly quiz.

Testing the null hypothesis that there is no difference between weeks of the course resulted in rejection of the null hypothesis for only the time spent using the lecture notes created by the instructor. The difference in use of the lecture notes between weeks was likely a function of the category definitions. Time spent using the lecture notes while watching the lecture videos was attributed to the lecture videos as watching the videos was the primary activity. Thus the time reported for the lecture notes category did not necessarily represent the time spent using the lecture notes. Since the measure for the lecture notes category is not necessarily representative of the lecture note usage, the meaning of this difference cannot be concluded. For all other categories, the distributions

of time did not vary significantly over weeks 5-8 of the course. The lack of difference between weeks for all other categories indicated that while the students vary in the amount of time they spent on coursework, they remain individually consistent over weeks 5-8 of the course.

Implications for Future Course Offerings

Web-based learning brings many new unknowns to the forefront of education. The instructors can no longer rely on physical cues such as the presence of students at their lectures and the engagement of students during a classroom lecture to gauge the effectiveness of their teaching. In fact, instructors and administrators have questioned the awarding of credits for Web-based coursework on the idea that it is difficult to observe whether the students are actually even completing the suggested work.

Within Web-based medical informatics education, this study helps to address some of these issues. The students participating in the courses to date have pursued the coursework with a strong commitment to expanding their knowledge. These students are employed full-time but manage their time to allow for the completion of their coursework. The students consistently completed their weekly quizzes on time and contributed regularly to the online discussions sharing substantive comments and personal experience to expand the learning process beyond the confines of the textbook. The measurements of the time spent by a sample of students on their coursework in this study indicate that most students are spending an appropriate amount of time on their coursework in comparison to the guidelines for independent study credits in the Masters

degree program. All of these observations point to the fact that these students pursuing medical informatics distance education are highly motivated to learn and are active in the learning process.

These students have made a strong commitment to learning and it is important that the instructors take these students and the Web-based courses very seriously. The content and structure of these courses should be well developed to encourage an efficient process of learning. In addition, the courses should be evaluated regularly. This study provides a first step in viewing the course from the student perspective on the issue of time spent on coursework. The allocation of time among the course activities indicates that students are spending most of their time on the term papers, the textbook, and the lecture videos.

These activities should be examined more closely. While researching and writing a term paper may provide an opportunity to further explore a topic of interest, it may not be the best use of student time, especially for students in rural areas with limited library access. The lecture videos should also be evaluated with special attention to the technology used. This study provides only a glimpse of the student perspective on the course through its examination of the time spent on coursework. Further evaluation is necessary to not only expand the understanding of the student perspective on the courses but also to serve as a starting point for continued refinement of the courses.

Limitations

Several limitations of this study have been identified.

1. Despite the participation of greater than 50% of the students in the course offering studied, the small number of subjects in this study was not ideal.
2. The study population was quite homogenous and may not have necessarily reflected the student population as a whole. For example, the study population was dominated by physicians with one administrative assistant and one medical librarian. In the full student population, a nurse and physicians in training were also present.
3. The instruments used were created specifically for this project and therefore have not been thoroughly tested. Some pretesting of the instruments was conducted but this was not adequate to fully validate them.
4. The method of self-reporting that was employed to collect the data was highly subjective. The students may have inaccurately estimated the times they reported. For example, an announcement was made to all students indicating that the final exam should take about 3 hours. The report of 180 minutes for the final exam by 4 of the 8 participants was likely influenced by this announcement and may not have reflected the actual time spent on the exam.
5. Limitation in the meaning of the study's results was also apparent. Since only one course was studied, the course structure may have been a confounding variable, influencing the allocation of time among study activities. Thus the conclusions drawn at the end of this study may not necessarily be applied beyond the specific course studied.

Future Research

This study prompts other areas for future research. Expanding the number of students and courses studied would be one possibility. Including qualitative measures to determine how the students feel about the time they are spending on the course and defining the influence of other factors on the amount of time available to spend on the coursework would also be interesting and useful to course instructors. Considering that none of the students participating in the study had previous experience with a distance learning course, it might be useful to follow up with these students in a later course to examine how the experience with the first course may have influenced their behavior in later coursework.

Conclusion

This study was conducted to examine the amount of time medical informatics distance learning students spent on course related activities. The study also investigated how students allocated their time among predefined study categories.

The results of the study suggest that the time that students spend on coursework and the allocation of this time among the predefined study categories vary greatly between students. While significant differences did exist between the students, the individual students remained consistent in their study habits over weeks 5-8 of the course. Time spent during weeks 9 and 10 varied greatly from the earlier weeks with the students spending large amounts of time on their term papers and final exams. The study also suggests that the distance students are spending an appropriate amount of time on coursework since the mean total time spent per week for most students either falls within or slightly below the suggested 9 – 12 hours per week for a 3-credit course.

References

- Campbell JK. Johnson C. "Trend spotting: fashions in medical education." *BMJ*. 318(7193):1272-5, May 8, 1999.
- Cariton KH. "Redefining continuing education delivery." *Computers in Nursing*. 15(1):17-22, Jan/Feb 1997.
- Digilio AH. "Web-based instruction adjusts to the individual needs of adult learners." *Journal of Instruction Delivery Systems*. v12 n4 p26-28 Fall 1998.
- Dowswell T. Hewison J. Hinds M. "Motivational forces affecting participation in post-registration degree courses and effects on home and work life: a qualitative study." *Journal of Advanced Nursing*. 28(6):1326-33, Dec. 1998.
- Eggen D. "Logging On to College." *Washington Post*. p B01 April 7, 2000.
- Ellsworth JH. "Typology of factors that deter participation with an educational institution." *Journal of Adult Education*. v20 n1 p15-27 Fall 1991.
- Gifford LJ. "Graduate students' perceptions of time spent in taking a course by Internet versus taking a course in a regular classroom." ERIC (The Educational Resources Information Center) Document # ED427767. 1998.
- Greenes RA. Shortliffe EH. "Medical informatics. An emerging academic discipline and institutional priority." *JAMA*. 263(8):1114-20, Feb 23 1990.
- Hezel RT. Dirr PJ. "Understanding distance education: identifying barriers to college attendance." ERIC Document #ED340335 June 1990.
- Hogan TP. Hendrickson E. "The study habits of adult college students." *Lifelong Learning*. v8 n1 p7-10 Sep 1984.

MacKenzie JD. Greenes RA. "The World Wide Web: redefining medical education."

JAMA. 278(21):1785-6, Dec 3, 1997.

Patton GA. Gardner RM. "Medical informatics education: the University of Utah

experience." Journal of the American Medical Informatics Association. 6(6):457-65, Nov-Dec 1999.

Schutte JG. "Virtual Teaching in Higher Education."

<http://www.csun.edu/sociology/virexp.htm>. Last visited April 10, 2000.

Sikorski R. Peters R. "Tools for change: CME on the Internet." JAMA. 280(11):1013-4, Sep 16, 1998.

Appendix

Data Collection Instruments

Time Allocation Log

Name:

Date:

Please indicate the amount of time (to the nearest 5 minute interval) spent on all course related activities. Categorize your activities using the following guidelines:

- **Textbook** - includes first time reading of the chapters as well as review.
However, it does not include use of the textbook as a reference for such activities as completing homework assignments, conducting research for the term paper, or studying for and completing the final exam as the reading of the text is not the primary goal of the activity. This category also covers reading of supplementary reading materials assigned by the instructor such as journal articles.
- **Lecture outline/notes** –includes reading and reviewing instructor generated lecture outline and any personal notes taken. It does not include time spent while using the outline or creating notes when viewing the video lectures since viewing the video is the primary activity.
- **Video lectures** - includes not only the actual viewing of the video but also the time spent waiting for the videos to download.
- **Weekly quizzes** - includes time spent searching for answers using any resources.

- **E-mail/discussion board** - includes course-related use of electronic mail and use of the discussion board tool.
- **Chat** – includes any use of the chat tool for real-time interaction with students and course staff.
- **Term paper** - refers to all activities, including use of the textbook for research, conducted in the process of completing the term paper.
- **Final exam** - includes reviewing the textbook, notes, video lectures, and all other course materials when reviewing for and completing the final exam is the primary goal.
- **Other** – for activities not classified above. Time listed as other must include a description of the activity

Category	Time Spent (to the nearest 5 minutes)
Textbook	
Lecture outline/notes	
Video lectures	
Homework	
E-mail/discussion board	
Chat	
Term paper	
Final Exam	

Other (describe activity and indicate time spent):

Background Information Questionnaire

Instructions - Please answer the following questions:

Name:

Age:

- 18-30
- 31-40
- 41-50
- 51-60
- Over 60

Gender: M F

Employment status:

- Employed full-time
- Employed part-time
- Full-time homemaker
- Full-time student

Current position: _____

Highest Degree:

- Bachelor's
- Masters
- MD
- PhD

Have you ever taken a distance learning or self-study course before this one?

Yes No

Have you ever taken an Internet based course before this one?

Yes No

When was the last course you completed for academic credit?

- 0-2 years ago
- 3-6
- 7-10
- more than 10