03B007I

Project Number: JGM0101 - 41

The Effectiveness of Different Media Types in ADLN Courses

A Interactive Qualifying Project Report:

submitted to the Faculty

of the

WORCESTER POLYTECHNIC INSTITUTE

in partial fulfillment of the requirements for the

Degree of Bachelor of Science

by

Ashwin B. Venkatesan

Date:

Approved:

Professor Jamshed Mistry, Major Advisor

TABLE OF CONTENTS

ABSTRACT

ADLN (Advanced Distance Learning Network) courses are developed to resemble as closely as possible courses delivered on-campus. Many consist of exactly the same class content and materials captured on videotape or delivered via interactive videoconferencing technology, depending on the facilities available to the student. Other courses are modified to take advantage of the Web to deliver course material entirely online. The purpose of this Interactive Qualifying Project (IQP) is to examine the effectiveness of different media types such as Video Tape, Video CD, Streaming Video, PowerPoint Tutorials, PowerPoint with Audio, and Streaming Audio, on ADLN students as the most preferred learning method. A survey was conducted among the ADLN students to evaluate the effectiveness of each media type and to analyze the advantages and disadvantages of each media type. Finally, it can be concluded that the most preferred are videotape and any combination of PowerPoint slides. At the same time it could be concluded that a combination of media type are required for any program both to provide options for the user as well as to communicate the material effectively.

ACKNOWLEDGEMENTS

I would like to take this opportunity to thank the following people without whom this project would not have been possible.

First, I would like to thank Professor Jamshed Mistry, my project supervisor who guided me throughout this project, and whose guidance and dedication made me work harder to make this project a success. In addition, my sincere thanks go to Professor Judith E Miller, whose advice and feedback enabled me to improve the project.

Second, I would like to my Professor Arthur Gerstenfeld, Professor Sharon Johnson and Prof Amy Zeng for allowing me access to their ADLN Students.

Finally, I would like to thank Peter McStravick and other IMC representatives for taking the time and effort to meet with me. In addition, a genuine thanks to all those who where directly or indirectly involved with this project.

1.0 Introduction

The fact that several books exist about the building of a web-based classroom indicates the growing need and desire for distance learning. Most professors aim to use a teaching approach that is effective, efficient and enjoyable. However, many existing approaches suffer from problems that negatively influence these goals. New approaches, web-based and other approaches offer characteristics that make it possible to more easily facilitate these ideas (Herring, 1999). Although courses offered over the Internet benefit both students and teachers, numerous disadvantages do exist.

In a web-based classroom, the geographic distance between the students and the professor need not change the quality of the learning experience. Students can learn from any geographic location with whatever tools they have and best suits their needs. This means that learning is no longer restricted to the physical buildings and the problems of overcrowded classrooms. Education can proceed without major reorganization of students' lives (Herring, 1999). Information stored in a web-based classroom can be changed at any time. There is no longer any delay in distributing material to students; as soon as it is on the web, students can retrieve it. Information can be corrected, or new and pertinent information can be added. Information can be changed in response to student's requirements or comments, or a change in the material being taught (McCormack & Jones, 1998).

The combination of the web's information and distribution possibilities and in conjunction with appropriate instruction can enable the learning experience to be flexible. There is no longer any need for a teacher and students to met in the same place at the same time. When participation in the learning experience occurs at a time convenient to both the student and the educator, there are ranges of advantages (Rea, White, McHaney, Sanchez, 2000). There is no longer any reason for a student or a professor to miss a class. Students no longer must compete with other students for the professor's limited time, and

both student and the professor have the time to formulate answers and responses without the pressure of having to provide an immediate reply (Darbyshire, 2000).

Many people find learning how to use computers difficult; as a result, they are often reluctant to use them at all. Any use of computers in education should aim to minimize the necessity to learn new skills. Where new skills are required, the professor should attempt to make those new skills useful in other areas. The popularity of the internet means that once a student or teacher knows how to use the Web, the knowledge can be used in other facets of life apart from education (French, 1999). The Web allows students to talk to each other, individually or as a group, and to send questions or hold conversations, oral or electronic, with the professor. Indeed, it is commonly reported that people will talk more via e-mail or a chat program then in a face-to-face situation (McCormack & Jone, 2000). Often times, this causes the student to become more demanding online then in person. Most student expect professors to respond to e-mails almost immediately (Rea, White, McHaney, Sanchez, 2000).

The greatest benefits of web-based classrooms occur though the most effective use of technology to increase the learning experience. One of the problems with on-line courses is that it assumes that students are self-motivated and capable of learning and studying alone, which is not always true, specifically when the a student first enrolls in college (Darbyshire, 2000). The issues of copyright, privacy, security and authentication are all important to consider in any classroom, not just web-based classroom. Solutions to these problems are still a long way for both web-based classrooms and tradition classrooms. Current copyright laws are inconsistent and are still struggling with the demands of traditional media such as print, painting, and music, so it is difficulty to apply them to the dynamic world of the internet (Throne, 2000).

2.0 Literature Review

2.1 Definition of learning

John Richardson et al (1987) state that learning is:

1) a quantitative increase in knowledge;

2) the acquisition of facts, methods etc which can be retained and used when necessary; and

3) an interpretative process aimed at understanding reality.

It can be noted from the points above that 'learning' is concerned with gaining more knowledge using processes such as memorizing, which means having the ability to call upon concepts learnt when the need arises. These statements capture what learning is about. Within the field of learning, there have been various models that have been talked about which capture the different aspects of learning. One of these models is the study of 'Behavioral Psychology' which emphasizes stimulus response, focusing on aspects such as activity, where learning can seen to be more beneficial when the user is actively engaged and not taking a passive stance. This suggests that people learn in an environment where the topic being addressed is discussed in the class or amongst friends.

Another are of study is 'Cognitive Psychology'. John Hartley (1994) states that "Cognitive psychology focuses on internal events. Learning results from inferences, expectations and making connections. Instead of acquiring habits, learners acquire plans and strategies, and prior knowledge is important." This suggests that people learn via expectations. For this type of learning to take place it is necessary that the learning material that is presented is well organized and clearly structured. When the author talks about prior knowledge it is important for the trainer to show how the new material fits in with what has been taught earlier. By examining these definitions, it is clear that these definitions need to be taken into consideration when designing a new system. The layout should be such that the user can navigate easily around the learning topics. With respect to the learning content that is presented, the layout should present examples where users

can visualize how things are done, which in turn, will help them to make connections between the theory and practice.

2.2 Computer Based Learning Definitions

Computers have the potential to deliver effective learning content. In the past, there have been various definitions that have been given as to what 'computer based training' is. Some of these are presented below:

Nigel Harrison (1991) states that Computer Aided Learning (CAL) is "Learning predominantly via the computer, e.g., lessons, exercises, simulations. Students may use workbooks, models etc, but the computer is an essential element in the learning event". This definition suggests that computer based training cannot be thought solely on its own. That is, some accompanying material such as workbooks will have to be used in conjunction with the computer. Thus the full capabilities offered by the computer cannot be fully utilized without accompanying material. As the title suggests it seems as though the point that is being made is that the computer is used to consolidate work which has been done elsewhere, such as in the classroom. Another aspect with respect to the use of the computer in a firm is that costs may still be quite high in that additional material has to be provided which increases costs and will require quite a bit of administration on the part of the firm. Another definition that has been given in the past is given below. This definition suggests that from a learning perspective there are no real benefits other than the fact that the user can learn at his or her own pace. Nigel Harrison (1991) states that Computer Managed Learning (CML) is "where the trainee is managed, directed to learning, and tested by the computer and a record of progress is maintained."

Here the emphasis is placed on the use of the computer as a teaching tool such that more emphasis is placed on actual learning material, and the progress of the user is tracked. For a firm this can be a useful concept as it allows them to track if an employee has completed a particular training course and then analyze the results accordingly. In relation to traditional teaching methods, it could be argued that teachers carry out the same tasks, except in this case the computer is used instead of textbooks. In contrast to

the definition given for Computer Aided Learning (CAL), this is a much broader statement in that it looks at other aspects of learning e.g., user tracking, though this will not affect the way a person learns.

All these definitions however, appear to be dated as, technology has progressed rapidly. The Internet has emerged at a startling pace and most people would have access to it in one shape or form and can also listen to audio\moving images online. The potential for learning on the web is great and the two definitions above fail to address this fact. In many ways, learning on the Internet is similar to Computer Managed Learning in that users can be tracked if the program, which is implemented, supports this feature. A further important point is that potentially, students can learn at their own pace, and choose their own path of study. In addition, they can skip any material that is not applicable to them. Learning on the web can also compliment CAL in that it aids the learning process since students can be tested online. This leads to another definition: Bill Tait (1997) states that Internet Based Learning (IBL) can be defined as, "any process which a learner is provided with access to courseware stored on the campus or the Internet from either location."

The definition given above makes an important statement, which should appeal to many firms, in that employees can complete those courses in their own time via the Internet, and should hopefully lead to lower costs in the end. Employees no longer have to travel around the country wherever the training may be based. Also, if need be these courses can be taught via CD-ROM, if for some reason the user cannot access the web. From a learning view, it means that the user can access the material at any time without having to worry if the Internet has been installed on a PC. IBL is also different from the other definitions in that the user has access to global rather than local materials. After examining the above definitions, it can be stated that computer based courses can be delivered through the web or through a CD-ROM and users can learn material in an interactive environment by working on exercises etc. For example, the user could be given some theory followed by some examples, at which point the user can be given the opportunity to try things on their own.

Again, the emphasis lies in the fact that employees can study the training material in their own time and allows "them to work at their own pace. In terms of an industrial context, it can help to train vast amounts of employees quickly and may indeed lead to a drop in overall training costs, saving money on accommodation and travel.

E learning:

E learning is the term used by many organizations when they refer to the latest form of training via computers. Many of the big players e.g. Cisco, KPMG, JPMorgan, PricewaterhouseCoopers and others are taking e learning very seriously, since it allows them to potentially reduce costs as explained above.

2.3 Styles of Computer Based Learning

The best style of learning depends on the type of control exercised. As D. M. Laurillard (1983) states "control may be exercised over: choice of content, sequencing, instructional strategy or the form of presentation". The control rules could be raised by the learner or through the use of software. Another important step would be to exercise this control diligently. Also, equal emphasis should be placed on the content, sequences, instructional strategy or the forms of instruction otherwise the control becomes ineffective. As D. M. Laurillard (1983) states: "A trainee would expect to relate failure of a component to the task of repairing it, because that is what the job entails, whereas a student might relate it to the structure of the material, because they are meant to understand why it fails, not how to repair it." The next step would be to differentiate between Computer Based Learning (CBL) and Computer Based Training (CBT), the former is concerned more with the theory aspects of learning and the latter on more practical situations i.e. real activity. Some of the advantages of CBT include:

1) allows users to learn the material they require and to skip other parts;
2) user can work at their own pace in their own time;
3) more cost effective in the long run - financial, time, accommodation, travel etc; and
4) if user tracking is used, then it allows the firm to check the training that the employees have completed;

5) allows the firm to get feedback on the programs they have produced;
6) saves on administration costs, such as getting someone to book rooms, trainers, and sending letters to all of the participants.

From this explanation, it can be noted that CBT is linked more to the practical aspects of a given problem. The concept states how the things learnt by a end user can be related to their actual job. Hence, when designing Computer based learning products, it is imperative that a right balance is maintained between the control, which is given to the learner, and that of the computer. The different styles suggested by D. M. Laurillard (1983) on CBL are:
1) drill and practice - presents a graded sequence of exercises, giving feedback in the form of correct answers;
2) tutorial - presents a teaching sequence followed by a test with feedback in the form of hints on further teaching;
3) simulation - provides a menu of options, which allows the student to 'operate' a system, specified by a model in the program, and to see the results of this operation; and
4) modeling - provides an environment (or data) within which the students can develop their own model of description and test their validity in that environment.

The balance of control between the learner and the software also differs based on the styles outlined above. With respect to 'drill and practice' and 'tutorial', the learner has little or no control over the order in which topics are presented. For a end user this can prove to be frustrating and may not be the best form of teaching as he/she cannot select how they want to learn for e.g. by going through the topics that are relevant to the user. 'Simulation' and 'Modeling' on the other hand offer the student greater amount of control, though these two modes do not necessarily teach the learner they instead offer the student an environment in which they can learn. It can be argued that this could be good, especially for adult learners who are genuinely interested in learning rather than being forced to learn new concepts. Hence, we could conclude that to exercise effective control and style of learning we have to know who the eventual audience will be. While simulation and modeling offer learners more control it has been argued that learners do

not always manage their own strategy very well and hence, as a result, the effectiveness of computer-based learning may not be maximized.

Learning and training together have a variety of different objectives. For example, learning to carry out a procedure, to use a concept, and to understand a system. First requires the students to learn the steps that must be carried out in order to complete the task. From a learners perspective it is important that these steps are repeated and practiced. This is where training comes in and the mode of 'drill and practice' is important. For example, if a user wants to learn how to insert a paragraph into a text file, this will make no sense to him/her unless they have a clear understanding about the concept of a text file and how the paragraph will be integrated into the file. It is important that designs of CBTs have clear rules and have meaningful examples from which the student can relate to as it follows that the material will then be easier to learn.

Educational Technology Centre, Irvine

Professor Bork and his team at the Educational Technology Center Irvine have developed a range of learning materials that incorporate both 'Tutorial' & 'Simulation' styles of CBL. The students are given the option as to what content to study, but they have no control over instructional strategy. In effect, the students will be given quizzes, which essentially act as tests, whereby the student will be given the opportunity to go through the material. In the event that the student answers incorrectly they will then be given a model answer. Simulations are used to give the students an insight into what the system can do:
D. M. Laurillard (1983) states that "the strategy adopted is to display examples of what the system can do and examples of operations the user may carry out in order to explore it."

This means that students must be allowed to see what will happen if certain tasks are carried out. From a learning perspective, the issue that arises is the level of control the user have. If too much control is exercised then it may follow that the students may not connect the result with the input. There may also be no structure to the learning and important traits of the underlying system may be missed. If on the other hand too little

control is exercised then the user may become bored and may loose interest in the program.

It must be noted that of the styles outlined above none can be said to be the correct one for any given application. For management it is imperative that they structure the learning content in such a way that the user is always fully engaged, and there is a balance between the control given to the student and that of the computer. In the context of teaching HTML, it is important that examples are presented and fully documented as to what is being done. There should also be opportunities to work through examples and in a sense let the student put into practice what they have learnt. From a control perspective, they should also be allowed to skip certain learning modules if they feel they are comfortable with the content or if they are not required to know more about a particular topic.

2.4 Kolbs Learning Inventory

David Kolb (1975) explained learning styles in great detail, and states that: "Learning style inventory is based on the conception that learning is a 4 stage cycle involving four adoptive modes:

1) Concrete Experience;

2) Reflective Observation;

3) Abstract Conceptualization; and

4) Active experimentation."

This essentially looks at how individuals learn whereby they have some understanding of a given process and then can build upon it and conduct experiments. Kolb's learning inventory has been designed to measure a student's preference for learning. It has been stated that 'concrete experimentation' & 'concrete conceptualization' form opposite ends of a continuum of learning & that 'active experimentation' & 'reflective observation' form another continuum. Each quadrant reflects a particular learning style:

1) Convergent learning style: where the strengths of learners are in problem solving, decision making and the practical application of ideas. Here it has been said that the "learners prefer dealing with technical tasks rather than social issues".

2) Divergent learning style: learners have opposite strengths to that of the converge learners. They prefer concrete experience and reflective observation. These learners' strengths lie in their imaginative ability and hence are useful in situations where ideas have to be thrashed out (e.g. brainstorming).
3) The assimilation learning style: these students strengths lie in their ability to create "theoretical models." It is more important for the theory to be logically sound and precise than for it to have any practical application.
4) Accommodative learning style: This style emphasizes concrete experience and active experimentation and tends to rely on other people rather than on its own "analytic ability/."

The learning styles outlined above, emphasizes that people have different preferences and that it is important that these issues are addressed when developing a computer based training product. The following quote emphasizes this further:
"The educational literature today often contains the term learning style along with the recommendation that learning style be matched with the teaching style so as to argument achievement" (Hyman & Rosoff 1994). Hyman & Rossoff also describe a four-step paradigm that brings up some important points about what learning advocates should follow:
1) examine the student's individual learning style;
2) understand and classify the students learning style;
3) match the student with a teacher whose teaching method is appropriate for the students learning style; and
4) Educate teachers to perform the previous four steps.
This can be related to computer-based training where the role of the teacher is now performed by the computer. Reichman-Hriska (1989) also make some valid points by stating that we " believe that subject matter content is important since the effort to learn will be exerted more easily if a direct payback exists from learning the skill or concept." This means that if the learning content is relevant and will aid a user in the task which they will eventually be performing, then they will be able to gain more from the program if the subject matter content is important. She also argues that the environment together

with total silence or some noise, as well as the day of week and time of day (structure of learning) can effect how one learns. This is practically true however in that it will ultimately depend on the individual, as everyone is different, i.e., some people may work well with music while others will prefer silence. The environment is important though, as a person may not be able to work in any environment.

3. Methodology

This project measures the perceptions of graduate students in the department of Management who were enrolled in ADLN courses. The data consisted primarily of opinions of the students as to the effectiveness of the media that was provided to them during the duration of the course. The study was conducted in four phases. The phases are described below:

First Phase: The first phase of the study involved finding the right topic and narrowing it down to a feasible project. Thanks to Professor Mistry, this was easily made possible. Once the topic was chosen a few faculty members in the management department who are teaching ADLN courses were consulted, in order to explore various methods to conduct the survey. I also consulted them in order to get their permission to survey students in their classes.

Second Phase: The second phase of my project involved designing the questionnaire and e-mailing it to the distance-learning students. The response rate was approximately 50%, which was primarily due to the involvement of ADLN faculty who personally asked their students to respond to the survey.

Third Phase: The third phase involved researching articles and books on distance learning and also studying about the ADLN system in other schools. This enabled me determine how to analyze the results once the questionnaire which was returned by the students.

Fourth & Final Phase: The final phase involved statistical analysis of the data collected through the questionnaire. Because this involved statistical analysis, I decided to use SPSS, a statistical package for my study. The software package helped to analyze data and determine the conditions of the project.

3.1 Survey Design

The Survey kept the overall focus of the project in mind and was limited to WPI students. The project goal was to determine the opinions of the students on ADLN learning and to determine the most effective media type to deliver the course material. The survey was designed to gauge the opinions of students on various media types and hence was broken down into different sections.

The first section was designed to give background information on the students. Information such as gender, highest level of education, employment status and the best method of learning was gathered. The second section asked questions about the student's opinions concerning the delivery and content of the courses and course material. The next section dealt with the times and methods of communication with the professor and the rest of the class. The final section was used to rate the preference of each media type from the list of media available to students.

The survey was pilot tested on two professors. The initial survey was provided to Professor Miller for her suggestions on improving the survey. Based on her feedback, the survey was redesigned. The revised survey was provided to Prof. Johnson, who suggested that a wider range of opinions could provide better data for analysis. Based on these suggestions the ranking system was changed and approval was obtained form all the professors who were teaching the ADLN courses and had agreed to participate on the format of the survey before the survey was emailed to the students.

3.2 Survey Group

Around 300 students at the graduate level were enrolled in ADLN courses at the time of the study. The management department provided me with a list of these students including their names and e-mail addresses. Due to ease of use and other cost factors, it was determined that the survey should be conducted via email.

3.3 Survey

The key questions consisted of a ranking system from 1 "strongly agree" to 6 "strongly disagree". The survey (see appendix) focused mainly on student's perceptions of the most effective media type used to deliver the contents of an ADLN course. Opinions on different media types included various formats of Video files, Audio files, Power Point tutorials and annotated Power Point slides. The survey asked respondents to rate the different means of communications, the overall quality of the media and the quality of the content and what the student feels is the best format. The ranking system was used to analyze student preference using Microsoft Excel. Finally, the survey asked questions about gender, highest level of education, employment status and the students learning style. Qualitative data dealt mostly with student's perceptions in various areas of the distance-learning program. Areas such as methods of delivery, interaction with the instructor and other students, and the use of MyWPI were used to gather student perceptions. More important, however, was the qualitative data concerning how frequently each student communicated with instructor and their peers as well as the top three preferences for the media type and the overall quality, clarity and satisfaction of each media type.

3.4 Analysis

The data analysis were conducted using SPSS:

1. Frequency distributions of each variable type to determine the distribution across student response. The distribution has 6 main tables detailing on demographics, learning method preference, preference of media type, student rating of quality of content, student rating on quality of format and preferred communication method;
2. Analysis of the data, based on Central tendency (Mean), Dispersion (Standard deviation) and Distribution (Skewness).

4. Data Analysis and Results

4.0 Results

The following section contains the results of the data that was collected using a survey transmitted electronically via email to the students of the ADLN program in the Department of Management. The reader should recall that there are no widespread published reports on how students feel about the different media types. Hence these results could be useful to the management department. Out of the 300 e-mail address provided by the Department of Management, 150 completed surveys were received from the students giving a response rate of 50%.

4.1 Demographics of Student Sample:

Table 1: Demographics of Student Sample					
Demographic Variables		**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Gender	**Male**	125	83.3	83.3	83.3
	Female	25	16.7	16.7	100.0
Education level	**Under graduate**	110	73.3	73.3	73.3
	Graduate	33	22.0	22.0	95.3
	Doctorate	7	4.7	4.7	100.0
Student Status	**Full time Student**	111	74.0	74.0	74.0
	Part time Student	39	26.0	26.0	100.0
Hours a week at work	**1 to 10**	41	27.3	27.3	27.3
	11 to 20	70	46.7	46.7	74.0
	21 to 30	10	6.7	6.7	80.7
	31 to 40	24	16.0	16.0	96.7
	>40 hours	5	3.3	3.3	100.0

Table 4.1: Demographics of Student Sample

WPI's Male-Female ratio is approximately 5:1. This was taken into consideration while conducting the survey. Also a greater emphasis was placed on collecting data from the graduate and full time students. Frequency distribution is an analysis, which gives the percentage distribution of each option across variable. To analyze this further the number of hours the sample population spends on working at their jobs was determined. As can

be seen from the survey about 46.7% of the sample work between 11 to 20 hours a week. This can be attributed to the fact that most of the surveys being taken are of graduate students in the management department at WPI who work either full time in the industry or part time as a graduate assistant.

4.2 Preferences of learning methods

Table 4.2.1: Preferences of learning methods					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Hours spent on school work	**3 to 5**	27	18.0	18.0	18.0
	6 to 9	35	23.3	23.3	41.3
	9 to 12	46	30.7	30.7	72.0
	> 12 hours	42	28.0	28.0	100.0
Participate in non-traditional classroom	**Yes**	93	62.0	62.0	62.0
	No	57	38.0	38.0	100.0
Preference for ADLN	**Yes**	115	76.7	76.7	76.7
	No	35	23.3	23.3	100.0
Best learning method	**Reading**	44	29.3	29.3	29.3
	Writing	17	11.3	11.3	40.7
	Visualizing	12	8.0	8.0	48.7
	Hearing	13	8.7	8.7	57.3
	Reading and Hearing	64	42.7	42.7	100.0

Table 4.2.1: Preferences of learning methods

Twenty-eight percentage of the population spends more than twelve hours a week preparing for their course work while thirty-one percent spend from nine to twelve hours a week. Sixty-two percent of the sample population has taken ADLN courses in the past,

while thirty eight percent have not taken any ADLN courses earlier. About three fourth of the population have a favorable impression about the ADLN program offered in the department of management at WPI. It can be determined from the frequency distribution that a greater percentage of the sampled population preferred reading and hearing (64%) as the best learning method, followed by reading only (44%) and writing (17%).

Table 4.2.2: How well did you learn the material covered in this distance learning class compared to a traditional classroom?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Much	107	71.3	71.3	71.3
	Much	36	24.0	24.0	95.3
	Moderate	7	4.7	4.7	100.0

Table 4.2.2: How well did you learn the material covered in this distance learning class compared to a traditional classroom?

A greater percentage of the students surveyed were satisfied by their experience in the ADLN courses they were taking that semester.

Table 4.2.3: Is interacting with the professor an important aspect of your learning experience?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Important	118	78.7	78.7	78.7
	Important	24	16.0	16.0	94.7

	Moderate	8	5.3	5.3	100.0

Table 4.2.3: Is interacting with the professor an important aspect of your learning experience?

Eighty percent of the students choose interacting with professor, as a very important aspect of their learning in the ADLN program meaning that most students feel the need to interact with the professor is necessary for the overall learning experience to be positive. A greater percentage of the students spend between fourteen to twenty-four hours on the computer to work on their ADLN courses. Similarly, a greater percentage of the students spend between fourteen to thirty hours using the computer for recreation (pertains to Data analysis on Questions 12).

4.3 Preference for type of media used

Table 4.3: Preference for the type of media used					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Video Tape	**1**	76	50.7	50.7	50.7
	2	57	38.0	38.0	88.7
	3	17	11.3	11.3	100.0
Video CD	**0**	148	98.7	98.7	98.7
	1	2	1.3	1.3	100.0
Streaming Video	**0**	146	97.3	97.3	97.3
	1	4	2.7	2.7	100.0
Power point with voice	**1**	42	28.0	28.0	28.0
	2	67	44.7	44.7	72.7
	3	41	27.3	27.3	100.0
Power point tutorials	**1**	32	21.3	21.3	21.3
	2	26	17.3	17.3	38.7
	3	92	61.3	61.3	100.0
Audio only	**0**	150	100.0	100.0	100.0

Table 4.3: Preference for the type of media used

As can be noted from the table above a greater percentage of the student population chose videotape (Frequency of 76 with preference percentage 51%) or any combination of power point slides as their preferred format.

4.4 Student rating of quality content

Table 4.4.1: Student rating of quality of content					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Video Tape	**Very Good**	60	40.0	40.0	40.0
	Good	48	32.0	32.0	72.0
	Moderate	31	20.7	20.7	92.7
	Fair	11	7.3	7.3	100.0
Video CD	**Moderate**	3	2.0	2.0	2.0
	Fair	3	2.0	2.0	4.0
	Very Bad	2	1.3	1.3	5.3
	Not Applicable	142	94.7	94.7	100.0
Streaming Video	**Moderate**	4	2.7	2.7	2.7
	Not Applicable	146	97.3	97.3	100.0
Power point with voice	**Very Good**	56	37.3	37.3	37.3
	Good	47	31.3	31.3	68.7
	Moderate	31	20.7	20.7	89.3
	Fair	16	10.7	10.7	100.0
Power point	**Very Good**	75	50.0	50.0	50.0

tutorials	**Good**	48	32.0	32.0	82.0
	Moderate	25	16.7	16.7	98.7
	Fair	2	1.3	1.3	100.0
Audio Only	**Moderate**	4	2.7	2.7	2.7
	Not Applicable	146	97.3	97.3	100.0

Table 4.4.1: Student rating of quality of content

A greater percentage chose Videotape (Quality best of 40%) and PowerPoint slides as the highest rate of quality in content that they received from their preferred format. This synchronizes with the previous table on the preference of media type. Hence, we could conclude that when the quality of content is the best, it is normally the most preferred media type.

4.5 Student rating on Quality of format

Table 4.5: Quality of format					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Video Tape	**Very Good**	60	40.0	40.0	40.0
	Good	48	32.0	32.0	72.0
	Moderate	31	20.7	20.7	92.7
	Fair	11	7.3	7.3	100.0
Video CD	**Moderate**	3	2.0	2.0	2.0
	Fair	3	2.0	2.0	4.0
	Very Bad	2	1.3	1.3	5.3
	Not Applicable	142	94.7	94.7	100.0
Streaming Video	**Moderate**	4	2.7	2.7	2.7
	Not Applicable	146	97.3	97.3	100.0
Power point with Voice	**Very Good**	56	37.3	37.3	37.3
	Good	47	31.3	31.3	68.7
	Moderate	31	20.7	20.7	89.3
	Fair	16	10.7	10.7	100.0

Power point tutorials	**Very Good**	75	50.0	50.0	50.0
	Good	48	32.0	32.0	82.0
	Moderate	25	16.7	16.7	98.7
	Fair	2	1.3	1.3	100.0
Audio only	**Moderate**	4	2.7	2.7	2.7
	Not Applicable	146	97.3	97.3	100.0

Table 4.5: Quality of format

A greater percentage chose Videotape (Quality best of 40%) and power point slides as the best quality of format. This synchronizes with the previous two tables on the preference of media type and the quality of content received. Hence, we could conclude that when the quality of format is good and the quality of content at its best, it is normally the most preferred media type.

4.6 Preferred communication method

Table 4.6: Preferred communication method					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Talking in person	**Very often**	100	66.7	66.7	66.7
	Often	31	20.7	20.7	87.3
	Sometimes	7	4.7	4.7	92.0
	Very few times	11	7.3	7.3	99.3
	Not used	1	.7	.7	100.0
Talking over the phone	**Sometimes**	18	12.0	12.0	12.0
	Very few times	84	56.0	56.0	68.0
	Not used	30	20.0	20.0	88.0
	Not applicable	18	12.0	12.0	100.0
Using Email	**Very often**	100	66.7	66.7	66.7
	Often	31	20.7	20.7	87.3
	Sometimes	7	4.7	4.7	92.0
	Very few times	11	7.3	7.3	99.3
	Not used	1	.7	.7	100.0

Discussion Board	**Very often**	32	21.3	21.3	21.3
	Often	40	26.7	26.7	48.0
	Sometimes	18	12.0	12.0	60.0
	Very few times	42	28.0	28.0	88.0
	Not used	12	8.0	8.0	96.0
	Not applicable	6	4.0	4.0	100.0
File Exchange	**Very often**	39	26.0	26.0	26.0
	Often	37	24.7	24.7	50.7
	Sometimes	14	9.3	9.3	60.0
	Very few times	42	28.0	28.0	88.0
	Not used	12	8.0	8.0	96.0
	Not applicable	6	4.0	4.0	100.0
Virtual classroom	**Sometimes**	27	18.0	18.0	18.0
	Very few times	64	42.7	42.7	60.7
	Not used	30	20.0	20.0	80.7
	Not applicable	29	19.3	19.3	100.0

Table 4.6: How often each measures of communication has been used

The most preferred measure of communication chosen by the sampled population is talking in person and e-mail (about 67%). This could be attributed to the fact that the more the personal attention or closeness to the real communication the better it is preferred. This is a very good mix of the traditional communication channel preferred (talking in class) at the same time giving priority to technology (email), as both gain the same preference percentage.

4.7 Analysis on central Tendency, dispersion and deviation.

The following tables highlight the mean, standard deviation, and skewness of questions 13, 14, 15 and 16. These are the main questions that enable the conclusions to be drawn regarding the effectiveness of different media types in ADLN courses.

The Mean gives us an average of the response. Since our rating goes from 1 being the most preferred or the best method to 6 being the least chosen or least preferred. A mean of lower numbers states that that particular quality is the best choice of the students that are surveyed. The smaller the mean the most centered the response is.

The **standard deviation** is a more powerful measure of variation since it measures the deviation of all values around the center (Mean).

The **skewness** statistic can be positive, negative or central if the data in the series is skewed towards the left, right or central. The higher the absolute value of this measure, the greater is the skewness.

The dispersion and the deviation are important in analyzing how far the values deviate from the mean.

Table 4.7.1 Survey question 13

If the same lesson was available in each of the following formats, in order of preference, which one would, you rather choose?							
		Video Tape	Video CD	Streaming Video	Power Point with Voice	Power Point Tutorials	Audio Only
N	Valid	150	150	150	150	150	150
	Missing	0	0	0	0	0	0
Mean		1.61	1.33E-02	2.67E-02	1.99	2.40	.00
Std. Deviation		.68	.12	.16	.75	.82	.00
Skewness		.689	8.572	5.936	.011	-.861	
Std. Error of Skewness		.198	.198	.198	.198	.198	.198

As can be noted from the above table, the average mean of Videotape (1.61) followed by PowerPoint slides are the lowest, thus helping us draw the result that the response is more centered towards the preference of Videotape and PowerPoint slides. This also substantiates the earlier deduction made using the frequency statistics. It can be seen that skewness for preferred media Videotape and PowerPoint slides is positive, meaning that the data results are skewed towards the right side. In addition, the deviation from the center (standard deviation) is neither too high nor low. Theoretically, a lower deviation is better for the accuracy of the results obtained.

Table 4.7.2 : Survey Question 14

Rate the quality of the content that you received for each of the following formats. (1-Very good; 2 – Good; 3 – Moderate; 4 – Bad; 5 - Very Bad; 6 – N/A) Where not applicable please circle 6 – N/A.							
		Video Tape	Video CD	- Streaming Video	Power point with Voice	Power point tutorials	Audio only
N	Valid	150	150	150	150	150	150
	Missing	0	0	0	0	0	0
Mean		1.95	5.89	5.92	2.05	1.69	5.92
Std. Deviation		.95	.51	.48	1.01	.79	.48
Skewness		.616	-4.736	-5.936	.548	.771	-5.936
Std. Error of Skewness		.198	.198	.198	.198	.198	.198

As can be seen from the table above, the average mean of PowerPoint slides (1.69) followed by Videotape (1.95) is the lowest. The response is more centered towards the preferred quality of content for Videotape and PowerPoint slides. This also proves our earlier deduction using the frequency statistics. We could also see that for the preferred quality of content, Videotape and PowerPoint slides the skewness is positive, meaning that the data results are skewed towards the right side. For the above analysis, the skewness is highly positive meaning that the curve is more flat and not bell shaped. In addition, the deviation from the center (standard deviation) is neither high nor low.

Table 4.7.3 Survey Question 15

How would you rate the overall quality of the following media format (clarity for example) used in this class. (1-Very good; 2 – Good; 3 – Moderate; 4 – Bad; 5 - Very Bad; 6 – N/A) Where not applicable please circle 6 – N/A.							
		Video Tape	Video CD	Streaming Video	Power point with voice	Power point tutorials	Audio only
N	Valid	150	150	150	150	150	150
	Missing	0	0	0	0	0	0
Mean		1.95	5.89	5.92	2.05	1.69	5.92
Std. Deviation		.95	.51	.48	1.01	.79	.48
Skewness		.616	-4.736	-5.936	.548	.771	-5.936
Std. Error of Skewness		.198	.198	.198	.198	.198	.198

As can be seen from the table above, the average mean of PowerPoint slides (1.69) followed by Videotape (1.95) is the lowest. The response is more centered towards the preferred quality of format for Videotape and PowerPoint slides. This also proves our earlier deduction using the frequency statistics. The skewness of videotape and PowerPoint slides is positive, meaning that the data results are skewed towards the right side. For the above analysis the skewness is positively very high meaning that the curve is more flat and not bell shaped. In addition, the deviation from the center (standard deviation) is low.

Table 4.7.4 Survey Question 16

Rate how often you used each of the following means of communication in this class (1 – very often; 2 – often; 3 – sometimes; 4- not often; 5 – not very often; 6- N/A))?							
		Talking in person	Talking over the phone	Using Email	Discussi on Board	File Exchange	Virtual classroom
N	Valid	150	150	150	150	150	150
	Missing	0	0	0	0	0	0
Mean		1.55	4.32	1.55	2.87	2.79	4.41
Std. Deviation		.93	.84	.93	1.44	1.49	1.00
Skewness		1.784	.585	1.784	.291	.324	.303
Std. Error of Skewness		.198	.198	.198	.198	.198	.198

As can be seen from the table above, the average mean of talking in person (1.55) and email (1.55) is the lowest. The response is more centered towards the preferred communication methods. The skewness of talking in person and email is positive, meaning that the data results are skewed towards the right side. For the above analysis, the skewness is high meaning that the curve is more flat.

Conclusion

The main goal of this project was to determine the effectiveness of various media types in ADLN courses. On examining the responses of the ADLN students when presented with six media types (video tape, video CD, streaming video, PowerPoint tutorial, PowerPoint with audio and streaming audio) it can be concluded that the most preferred are videotape and any combination of PowerPoint slides. At the same time it could be concluded that a combination of media type are required for any program both to provide options for the user as well as to communicate the material effectively. More experimental studies are needed in the area of media selection, where researchers can compare the effectiveness of different technologies, which deliver similar content to similar audiences. It would also be useful to analyze the content of a learning module, the goals of the students, teacher, and the school itself, implement some different technologies, and determine what factors influence successful delivery.

Effective distance learning requires extensive preparation, as well as adapting traditional teaching strategies to a new learning environment, which often lacks visual cues. Porter (1994) suggests that the triad, which consists of the student, the teacher, and the site facilitator, must all function as a team. Students must quickly become aware of and comfortable with new patterns of communication, learn to manage their time, and take responsibility for their own learning. Teachers must enable students to establish contact with them, as well as interact among themselves. Finally, the site facilitator must ensure that the website functions effectively throughout the course.

The variety of different media available presents a formidable research problem. One cannot compare print-based independent study courses, electronic projects on the Internet, classroom BBS postings, audio conferences, and live, two-way interactive television, and expect these comparisons to be valid. To add to this dilemma, media selection is often a question of media assignment. Teachers and site facilitators need training in the technologies that they are expected to use.

APPENDIX A- Cover Letter

Dear ADLN Students,

My name is Ashwin Venkatesan and I am an undergraduate student in WPI management department. I am currently completing my Interactive Qualifying Project (IQP). The Interactive Qualifying Project (IQP) challenges students to identify, investigate, and report on a self-selected topic examining how science or technology interacts with societal structures and values. The objective of the IQP is to enable WPI graduates to understand, as citizens and as professionals, how their careers will affect the larger social of which they are part. The project entitled "Different Media Types on ADLN", is being conducted to help select the most effective mediums for transferring course materials to

As part of the project, I am conducting a survey of students who are taking an AADLNN course to evaluate the different media types that where used by the Management Department. The data gathered here will be crucial to the IQP and will aid with the selection of media types for future classes.

Please take a few minutes and complete the enclosed survey. Where the question does not apply to you, please make sure you indicate N/A and kindly forward the completed survey to cybrpunk@wpi.edu

Thank you for your time and cooperation both, students in the distance-learning program and in traditional classroom.

Sincerely,

Ashwin Venkatesan, WPI '03

Appendix B - Survey

1. What is your Gender?

    - Male
    - Female

2. What is your highest level of education?

    - Bachelors (BS)
    - Masters (MS)
    - Doctorate (Ph.D.)

3. Employment Status?

    - Full time student
    - Part time student
    - Unemployed
    - Full time employed

4. If you are employed, approximately how many hours a week do you work at the office?

    - 1 to 10
    - 11 to 20
    - 21 to 30
    - 31 to 39
    - > 40

5. Approximately how many hours a week do you spend on school work?

- 1 to 2
- 3 to 5
- 6 to 9
- 9 to 12
- > 12

6. How do you feel that you learn the best?

   - Reading
   - Writing
   - Visualizing
   - Hearing
   - Reading and Hearing

7. Have you ever participated in a non-traditional classroom other than this one?

   - Yes
   - No

8. Would you participate in a distance-learning program based on your experiences in this class?

   - Yes
   - No

9. How well did you learn the material covered in this distance learning class compared to a traditional classroom? (1 – Very much; 2 – Much; 3 – Moderate; 4- Little ; 5- Very Little)

1 2 3 4 5

10. Is interacting with the professor an important aspect of your learning experience (1 – Very Important; 2 – Important; 3 – Moderate; 4- Not Important; 5- Not very Important)

1 2 3 4 5

11. Is interacting with the other students an important aspect of your learning experience (1 – Very Important; 2 – Important; 3 – Moderate; 4- Not Important; 5- Not very Important)

1 2 3 4 5

12. How many hours a week at home do you spend on each of the follow activities:
    - Using the computer for work ___
    - Using the computer for recreation ___
    - Watching television for work. ___
    - Watching television for recreation. ___

13. If the same lesson was available in each of the following formats, in order of preference which one would you rather choose?
    - Video Tape ___
    - Video CD ___
    - Streaming Video ___
    - Power Point with voice ___
    - Power Point Tutorials ___
    - Audio Only ___

14. Rate the quality of the content that you received for each of the following formats. (1-Very good; 2 – Good; 3 – Moderate; 4 – Bad; 5 - Very Bad; 6 – N/A) Where not applicable please circle 6 – N/A.

o Video Tape	1	2	3	4	5	6
o Video CD	1	2	3	4	5	6
o Streaming Video	1	2	3	4	5	6
o Power Point with voice	1	2	3	4	5	6
o Power Point Tutorials	1	2	3	4	5	6
o Audio Only	1	2	3	4	5	6

15. How would you rate the overall quality of the following media format (clarity for example) used in this class. (1-Very good; 2 – Good; 3 – Moderate; 4 – Bad; 5 - Very Bad; 6 – N/A) Where not applicable please circle 6 – N/A.

o Video Tape	1	2	3	4	5	6
o Video CD	1	2	3	4	5	6
o Streaming Video	1	2	3	4	5	6
o Power Point with voice	1	2	3	4	5	6
o Power Point Tutorials	1	2	3	4	5	6
o Audio Only	1	2	3	4	5	6

16. Rate how often you used each of the following means of communication in this class (1 – very often; 2 – often; 3 – sometimes; 4- not often; 5 – not very often; 6- N/A))?

a. Talking in person	1	2	3	4	5	6
b. Talking over the phone	1	2	3	4	5	6
c. Using email	1	2	3	4	5	6

d. Using discussion boards	1	2	3	4	5	6
e. File Exchange	1	2	3	4	5	6
f. Discussion Board	1	2	3	4	5	6
g. Virtual Classroom	1	2	3	4	5	6

References

Bastiaens, T.J., & Martens, R.L. (2000). Conditions for Web-based learning with real events. In B. Abbey (Ed.), Instructional and cognitive impacts of Web-based education (pp. 1-31). Hershey, PA & London: Idea Group Publishing.

Darbyshire, P. (2000). Distributed Web-based assignment management. In A. Aggarwal (Ed.), Web-Based learning and teaching technologies: opportunities and challenges (pp. 198-215). Hershey, PA & London: Idea Group Publishing.

French, D. (1999). Preparing for Internet-based learning. In D. French, C. Hale, C. Johnson, & G. Farr (Ed.), Internet-Based Learning: An introduction and framework for higher education and business (pp. 9-24). Sterling, VA: Stylus Publishing, LLC.

Herring, J.E. (1999). Exploiting the Internet as an information resource in schools. London: Library Association Publishing.

Ingis, A., Ling, P., & Joosten, V. (1999). Delivering digitally: Managing the transition to the knowledge media. London: Koogan Page.

Margolis, M. (2000). Using the Internet for teaching and research: A political evaluation. In R.A. Cole (Ed.), Issues in Web-based pedagogy: A critical primer (pp. 9-22). Westport, CT: Greenwood Press.

McCormack, C., & Jones, D. (1998). Building a Web-based education system. New York: John Wiley & Sons, Inc.

Miller, S.M., Miller, K.L. (2000). Theoretical and practical considerations in the design of Web-based education. In B. Abbey (Ed.), Instructional and cognitive impacts of Web-based education (pp. 156-77). Hershey, PA & London: Idea Group Publishing.

Mihai PARASCHIV (June 1998), .Advantages and disadvantages of Distance Education through the Internet <http://www.patratel.com/efl/efl33.html>

Peter McGuire Professor, School of Literature, Communication and Culture Ph.D., Brown University Advantages and Disadvantages of Distance Learning <http://www.lcc.gatech.edu/~mcguire/advantages_disadvantages.htm>

Rea, A., White, D., McHaney, R., Sanchez, C. (2000). Pedagogical methodology in virtual courses. In A. Aggarwal (Ed.), Web-Based learning and teaching technologies: opportunities and challenges (pp. 135-54). Hershey, PA & London: Idea Group Publishing.

Wallin, John. (2001, January). Web-based education coming of age. Sky & telescope, 101 (5) p. 77. <http://ehostvgw15.epnet.com/ehost1.asp?key=204.179.122.141_8000_2115087735&site=ehost&return=y&custid=s7324964&ip=yes.>