Comparing Learning Effectiveness Based On Use Of Different Media For Delivery Of Content

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ABSTRACT

In an attempt to understand better how the use of different media of delivery of content at a distance affect learning effectiveness, the Commonwealth of Learning initiated a survey of adult learners engaged in workplace training to undertake the poll. This paper reports on the process and the outcomes of the survey.

INTRODUCTION

In recent years, the Commonwealth of Learning (COL) has been involved in the design, development, and delivery of a series of distance learning courses for international non-governmental organisations. The subject of these courses is effective writing for the workplace, with each course customized to the particular writing needs of the organisation. The first course, developed for the United Nations High Commissioner for Refugees (UNHCR) was designed as a traditional print-based package with tutorial support provided using email. As a result of the success of this course, COL adapted the course for two other clients, the World Health Organisation (WHO) and the Joint United Nations Programme on HIV/AIDS (UNAIDS). The design was essentially the same as the original UNHCR course except for one significant difference: the course content was made available not in a print form, but electronically via Intranet and CDROM. Subsequent course evaluations have indicated different levels of completion between the two groups of learners (i.e., UNHCR and WHO/UNAIDS learners). A survey distributed to both groups sought to determine whether learners perceived any effect on their learning based on the medium of the content delivery (print or electronic). Despite the differences in course content format, both groups of learners are

supported by individually focused tutoring via email. Learners were surveyed by a questionnaire (Appendix 1) to ascertain the learning effectiveness through this customized, work-place distance learning course.

LEARNING OBJECTIVES

Good work in an organisation depends on the good communication skills of its employees. Effective writing has long been identified as a required workplace core-competency at UNHCR, WHO and UNAIDS because of the need for these organisations to report on country situations in light of disaster outbreaks, to communicate disaster relief plans and measures, disseminate health warning reports, announce outbreaks of pandemic, issue travel advisory, and to advocate for HIV/AIDS prevention and treatment. A training course that can help strengthen this core competency of all staff irrespective of their location and ranks is in line with the principle of democratization of learning at these UN agencies. However, the decentralized and dispersed composition of these organisations presents a considerable instructional design challenge for those who wish to provide such training. Simply, can the field worker in Kabul or the health programmer in the Congo have access to organisation-wide training on an equitable level with the office worker in Geneva? To ensure equity and accessibility to this training opportunity, open distance learning offers a highly appropriate and manageable alternative.

The original course materials for "Writing Effectively for UNHCR" were developed as a print-based package, consisting of a spiral-bound, A4 size workbook of 250 pages. The course "Writing Effectively for WHO/UNAIDS," which was adapted from the original UNHCR course, was developed in a web-based format. This set of materials, designed as a discrete website, sits on the intranets of WHO and UNAIDS and is also available on CD-ROM as an alternate resource for learners with unstable access to the Intranets. Both sets of materials were designed using the principles of tell and test, tutorial-in-print, and reflective action. All materials were tested through a pilot before full implementation. The choice of medium was made by consulting pre-development with the training chiefs of these organisations and by interviewing a broad spectrum of potential learners selected from across functions and locations; from headquarters in Geneva to regional offices around the world.

While traditional definitions of distance education focus on the communicative relationship between learners, resources, and educators, there is perhaps less attention paid to the media of the learning materials (Ely, 2003). Our interest was piqued by the

fact that for the most part, the communicative element within this triangle of interactivity was almost identical between the UNHCR and the WHO/UNAIDS courses. What distinguished them from each other was the nature of the learning materials. Moreover, end-of-course evaluation feedback has indicated greater challenges to completion by the "e-learners" (WHO/UNAIDS learners) over the print-based learners (UNHCR), essentially lack of time. Therefore, this study seeks to determine the influence of print and on-line materials on learning effectiveness - specifically is the medium of content delivery a factor in course completion?

LEARNING EFFECTIVENESS

There are many definitions of learning effectiveness. On the one hand, effectiveness is defined in terms of measurable outcomes, such as scores, minimum standards, and national averages. On the other hand, some see it as relating more closely to the achievement of learning outcomes and the speed of learning/completion. Another perspective regards effectiveness as more rooted in performance, and therefore learning effectiveness becomes a measure of productivity, skills inventories, and employability (Dusick, 1998). For the purposes of our investigation, we took the view that learning effectiveness is based on the perceptions of the learners themselves in terms of their own assessment of learning as well as their experience with the course materials. To many, online learning is still a relatively new experience and many neophyte learners are finding themselves embarking on a journey of discovery as they go through the course. Apart from the basic challenges of pursuing a distance education course, such as organising one's time and working independently, learners need to make the best use of the resources provided to them. In adapting this writing course for a web-based presentation, there was also the view that this relatively new style of content presentation would take advantage of the novelty effect and heightened expectations offered by the new medium, which would thereby encourage learners to interact with the course materials more willingly (Gillis et al., 2000). Our survey, therefore, examines the effectiveness of learning brought about by the use of technology.

There are different opinions about the relative effectiveness of different media of instruction. Chu and Schramm (1968), Clark (1983), and Hilary Perraton (2004) note that “there are unlikely to be significant differences in the educational effects of different media”. A different perspective on the role of technology in learning is offered by Peters (2002). Peters employs language of futurism such as “prognoses” and “ prophecies” to describe how technology will reform and transform teaching and learning. This kind of techno-utopian view makes optimistic claims on the potential of

technology to create a paradigm shift from directed and regulated learning where teachers expound and learners receive to autonomous learning. In this way, new ways of teaching and learning serve to enhance more traditional methods through multi-sensory stimulation by the multi-faceted presentation capability of technology. In a completely digitized learning environment, learners take greater control of their learning—where to start, where to go, what to choose, how to assimilate and where to apply their knowledge. One's learning horizon is expanded such that a learner can move in a non-linear fashion by browsing through hypertexts, hyperlinks, virtual libraries, databases, and engaging in virtual communication. This largely uncritical view of online learning depends heavily on the use of technology as the impetus for improved methods of teaching and learning.

As an emerging focus for research, online learning has begun to reveal some interesting trends. For example, in the Delphi study conducted by Beck, Glotz, and Vogelsang (2000), there appears to be some promise in online learning as an significant element in the area of "learning effectiveness":

Over half of those polled are of the opinion that the individual learning effectiveness* increases with online learning. However, this took place to a different extent with current learning contents. The greatest increase in effectiveness was predicated in scientific/technical subjects (82.6 percent), in receptive learning (78.9 percent) and with language-related contents (67) percent).

* Unfortunately the survey did not determine what “learning effectiveness” is understood by those polled.

METHOD

In the COL survey, 102 online learners from WHO/UNAIDS and 102 learners from UNHCR were polled through an electronic questionnaire to determine their views on their perceived learning effectiveness when the course materials were online compared to when they were delivered in a print-based form. All the learners polled completed their learning in 2003. They were emailed the questionnaires and asked to complete it within a fortnight. Out of the 204 learners surveyed, 25 UNHCR participants and 20 UNAIDS/WHO participants emailed completed questionnaires back to COL. The response rate is low as the participants were allowed two weeks to respond and no follow up reminders were sent owing to lack of resources.

MEASURES

There are ten sections in the WHO/UNAIDS questionnaire and five in UNHCR. The latter does not include technology related questions. Our questionnaire was developed based on three existing and well tested surveys (Curtin University, 2003; Chan et al., 2001; and Rovai and Barnum, 2003).

Course organisation – Participants were requested to rate their degree of satisfaction about the course structure on a 5-point scale (1- strongly disagree, 5-strongly agree). The scores were summed up to form a total score, with high scores representing high satisfaction. There were seven statements on course aims, objectives, outline, workload and supplementary materials. This scale was based on the On-line teaching and learning evaluation questionnaire from Curtin University (2003). The reliability (Cronbach Alpha) in this study was .86.

Learner support – Participants were requested to rate their satisfaction with the tutoring support (e.g. answering questions, giving constructive feedback) on a 5-point scale (1- strongly disagree, 5-strongly agree). The scores were summed up to form a total score, with high scores representing high satisfaction. This scale was based on the On-line teaching and learning evaluation questionnaire from Curtin University (2003). The reliability (Cronbach Alpha) in this study was .98.

Course satisfaction – Participants were requested to rate their degree of satisfaction with the course in general on a 5-point scale (1- strongly disagree, 5-strongly agree). The scores were summed up to form a total score, with high scores representing high satisfaction. There were ten statements on issues such as independent learning, application of content to work and increased interest and knowledge. This scale was based on the On-line teaching and learning evaluation questionnaire from Curtin University (2003). The reliability (Cronbach Alpha) in this study was .94.

Opinions about the software – Participants were requested to rate their degree of satisfaction with the software on a 5-point scale (1- strongly disagree, 5-strongly agree). The scores were summed up to form a total score, with high scores representing high satisfaction. There were seven statements on issues such as access to software and ease of use of the external links. Only the online course participants were requested to answer this section. This scale was based on the On-line teaching and learning evaluation questionnaire from Curtin University (2003). The reliability (Cronbach Alpha) in this study was .71.

Time spend on using software - participants were requested to rate their degree of satisfaction with the time required for dealing with the software on a 5-point scale (1-strongly disagree, 5-strongly agree). The scores were summed up to form a total score; the higher the scores, the lower the satisfaction. There were five statements on issues such as time needed for downloading and time needed for navigating the course. Only the online course participants were requested to answer this section. This scale was based on the On-line teaching and learning evaluation questionnaire from Curtin University (2003). The reliability (Cronbach Alpha) in this study was .81.

Attitude towards online course – This consisted of six questions on attitudes towards online courses (e.g. positive attitude towards online courses, confidence in using computers) and frequency of browsing the internet. Participants rated their agreement with each question on a 5-point scale (1- strongly disagree, 5-strongly agree). The scores were summed up to form a total score, with high scores representing high satisfaction. In addition, participants were requested to indicate their frequency of browsing the online course per week (< 3 hours, 3 – 5 hours, 5 – 7 hours, > 7 hours). The scale is based on the scale used by Chan et al. (2001). Only the online course participants were requested to answer this section. The reliability (Cronbach Alpha) in this study was .83.

Perceived learning – This was based on Rovai and Barnum (2003) and included two items on perceived learning (how much did you learn in this course) and perceived learning if taught in a traditional face-to-face course. Participants rated their degrees of learning on a 5-point scale from 1 (learned nothing) to 5 (learned a lot). For the printed version participants, they were requested to answer an additional question on perceived learning if taught in an online course.

Demographic information - participants were requested to supply basic demographic information such as age, gender, occupation, education, place of work (headquarters, regional office etc), access to computer at work and at home.

RESULTS

Chi square tests indicated that there was no significant difference between the two groups in terms of age, gender, occupation, educational level, mother tongue, access to computer at work and at home, and office location. The demographic information of the two groups is presented in Table 1.

		UNHCR	UNAIDS/WHO	Total
Gender	Male	6	7	13
	Female	15	13	28

	Total count	21	20	41
Age	21 - 25	3	0	3
	26 - 30	3	2	5
	31 - 35	5	3	8
	36 - 40	7	4	11
	41 - 45	4	3	7
	Above 45	1	8	9
	Total count	23	20	43
	% of Total	53.49%	46.51%	100.00%
		UNHCR	UNAIDS/WHO	Total
Education	≤ 12 years	3	1	4
	College but no degree	5	2	7
	College with degree	6	3	9
	Postgraduate	9	14	23
	Total count	23	20	43
	% of Total	53.49%	46.51%	100.00%
Occupation		UNHCR	UNAIDS/WHO	Total
	Technical	1	1	
	Clerical / Secretarial	11	8	
	Professional	9	9	
	Others	1	1	

Table 1: Demographics Data

The mean and standard deviation scores of the scales and measures are presented in Table 2.

	Printed version (UNHCR) (*n* = 25)	Online version (UNAIDS/WHO) (*n* = 20)
Course organisation (7 items)	28.16 (5.42)	29.75 (3.09)
Staff support (4 items)	17.65 (4.47)	18.90 (2.22)
Course satisfaction (10 items)	40.24 (8.38)	41.65 (6.94)
Perceived learning (1 item)	4.00 (.66)	4.15 (1.04)
Software (7 items)	NA	29.35 (3.56)
Time spent on software (5 items)	NA	12.20 (4.60)
Attitude towards online course (7 items)	NA	24.43 (4.12)

Table 2: Mean and standard deviation scores

Correlation analysis was used to examine the relationship among the variables. The three course satisfaction scores (satisfaction with course organisation, satisfaction with staff support, and satisfaction with course in general) were all significantly correlated

with one another. Perceived learning, however, was only correlated with course satisfaction. For the UNAIDS/WHO (e-learners) participants, their satisfaction with course organisation was correlated with their satisfaction with the course software, attitude towards online course, and perceived learning but not with the time spent on using the software. Their satisfaction with the course in general and their perceived learning were also correlated with their attitude towards online course. Satisfaction with staff support was not related to satisfaction with the course software, attitude towards online course, and the time spent on using the software. The correlations are shown in Table 3

	Course organisation	Staff support	Course satisfaction	Perceived learning	Software	Time spent on software
Staff support	.77***					
Course satisfaction	.82***	.82***				
Perceived learning	.21	.13	.42**			
Software[a]	.53*	-.04	.22	.24		
Time spent on software[a]	-.30	.02	.06	.28	-.38	
Attitude towards online course[a]	.60**	.43	.83***	.71***	.54*	-.06

Table 3: Correlation among variables

a: only relevant for online course participants
** p < or = .005
*** p < .001

To examine group differences in satisfaction with the course, multivariate analysis of variance (MANOVA) was used. The independent variable was course format (online versus printed) and the dependent variables were satisfaction with course organisation, satisfaction with staff support, and satisfaction with course in general. The results indicated that there was no significant difference between the two groups.

Dependent t test was used to examine the possible perceived difference in terms of course format. For the e-learner participants, there was no significant difference between their rating for their online course and their rating for the statement "How much do you think you could have learned in this course if it had been a traditional face-to-face course that met regularly in a classroom?" For the text-based learner participants, there was a significant difference between their rating for printed version teaching and online teaching, $t(23) = 2.53$, $p < .05$. Participants gave a higher score to

"printed version " teaching (M = 4.00, SD = .66) than online teaching (M = 3.25, SD = 1.11). There was also a significant difference between the ratings for the face-to-face teaching and online teaching, $t(23) = 3.33$, $p < .005$. Participants assigned a higher score to face-to-face teaching (M = 3.96, SD = 1.16).

As perceived learning was not correlated with the variables included in the MANOVA, an independent t test was used to examine difference between the two groups of learners. The result indicated no significant difference.

Analysis of variance (ANOVA) results showed that there was a significant difference in satisfaction with course organisation, $F(3, 39) = 4.52$, $p < .01$ and learner support, $F(3, 39) = 4.33$, $p = .05$, by educational qualifications. Post hoc test (scheffe) indicated that those with postgraduate qualifications rated course satisfaction higher (M = 30.48, SD = 2.86) than those without a degree (M = 24.14, SD = 8.49). Post hoc test (scheffe) indicated that those with postgraduate qualifications rated learner support higher (M = 19.39, SD = 1.23) than those without a degree (M = 14.14, SD = 7.67). When the two groups of learners were separately analysed, it was only among the online learners where there was a significant difference in learner support by education level, $F(3, 16) = 3.50$, $p < .05$. Post hoc tests could not be performed because of small cell sizes in some of the cells. In general, those with degrees and postgraduate qualifications were more satisfied than those without degrees. There was no age difference in course satisfaction, learner support or perceived learning. There was no interaction effect of course and educational qualifications for course satisfaction or learner support.

DISCUSSION

The results indicate that students are satisfied with the course regardless of which medium in which they accessed the materials. As well, there was no difference in their perceived learning. However, the text-based learners preferred face-to-face teaching and print-based teaching to online learning. For the e-learners, there was no difference in their preference for either online learning or face-to-face learning. Overall, perceived learning was related to course satisfaction.

At this stage, the limitations of the study should be pointed out. Only about 20% of the potential participants returned the questionnaires. It is possible that those who returned the questionnaires are the ones who are more satisfied with the course and this should be taken into consideration in the interpretation of the results. However, the response rates of the two groups are not too different. The correlation results serve to provide clues about factors related to course satisfaction and perceived learning.

In this study, effectiveness was not measured in terms of the actual content learnt or the standard of learning achieved. Nor did we employ a control group for this study. However, the present results provide information which could be further tested using more rigorous designs.

CONCLUSION

The survey has underlined the statement that educational effect is unaffected by choice of medium as long as medium is engaged appropriately. Effective learning obviously involves the entire range of decisions related to course design, from tutor-student interaction, administrative support, and the organisational environment as well as the quality and design of the learning materials. If the materials are well designed, taking into account different aspects of the two media under discussion, learners can benefit from accessibility and flexibility in either medium. It seems that technology learning is welcomed by those who have a taste of it, but not by those who have not. It might be worth expanding the learning horizons of those who have not yet been exposed to on-line learning because of technology's predominant presence at the workplace, home, in schools and in the society.

Furthermore, while print may not be as attractive as a medium for learning materials, it is nonetheless rooted in strong traditions of design, organisation, functionality, and usability, which all have an impact on the total learning experience. The online medium, on the other hand, is still relatively new, even though educators have made amazing strides in the past twenty years. Practices for materials development and selection of media for different educational purposes continue to be explored, revised, and re-established (Murphy, 2000). Along with these developments, innovative ideas in the use of online environments for learning continue to emerge, making this an exciting but also uncertain time for distance educators as traditional methods struggle to find new expression amidst radical changes in the uses of technology.

Owing to the limited resources to undertake this polling, we must stress that the attitude towards the courses is related to *perceived* learning and not tested in the outputs and outcomes of learning. Nor can we conclude from our study that the complaints of inadequate time for course completion are directly related to the medium of the learning materials themselves. The slower assignment completion rate in the online environment could be seen as positive or negative. On the positive side, it could be that learners are consumed by the resources made so readily available in cyberspace and are spending more time taking in more information, processing more data. In other words, more learning is taking place, but outside the realm of the assignments.

On the negative side, distractions such as Internet surfing and technological requirements such as needing to download the course materials onto ones' desktop and launch the CDROM before accessing the course could be taking up time previously spent on assignments. In addition, until each participant has their own laptop and therefore can access the course anytime, anywhere, online delivery still offers less flexibility than a print-based course that all participants can tuck under their arm and carry with them anytime, anywhere. Indeed, there are many directions we could take into further investigations.

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