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Editorial

Action Plan for Higher Education: Improving Accessibility, Affordability and Accountability

September 2006[1]

> "Over the years, we've invested tens of billions of dollars in taxpayer money and just hoped for the best. We deserve better."
> — U.S. Secretary of Education Margaret Spellings

A college diploma has become increasingly essential to achieving the American Dream. One year ago, Secretary Spellings formed the bipartisan Commission on the Future of Higher Education to launch a robust national dialogue on the need to strengthen higher education to remain competitive in the 21st century. The Commission's Sept. 19, 2006 final report—***A Test of Leadership: Charting the Future of Higher Education***—found that "U.S. higher education needs to improve in dramatic ways," changing from "a system primarily based on reputation to one based on performance."

Today, Secretary Spellings announces an Action Plan designed to improve higher education's performance and our ability to measure that performance. The proposals will make higher education more accessible, affordable and accountable to students, parents, business leaders and taxpayers.

Accessibility

> "There are far too many Americans who want to go to college but cannot—because they're either not prepared or cannot afford it." — Secretary Spellings

To expand access to higher education we must better educate and prepare our students, beginning with high standards and accountability in our public schools.

The Secretary's proposal:

- Strengthen K-12 preparation and align high school standards with college expectations.
- Work with Congress to expand the successful principles of the *No Child Left Behind Act* to high schools.
- Redesign the 12th-grade NAEP (Nation's Report Card) test to provide state-level estimates of college and workforce readiness.
- Raise awareness and mobilize leadership to address the issue of adult literacy as a barrier to national competitiveness and individual opportunity.
- Develop a federal research agenda for adult literacy to identify strategies, models and programs that work.

Facts and Findings:

> "Access to American higher education is unduly limited by... inadequate preparation, lack of information about college opportunities, and persistent financial barriers." — Commission on the Future of Higher Education

- While about 34 percent of white adults have obtained bachelor's degrees by age 25-29, the same was true for just 18 percent of African American adults and 10 percent of Hispanic adults in the same age cohort.
- Forty percent of college students will take at least one remedial education course, at a cost of over $1 billion yearly.
- Over 60 percent of the U.S. population between the ages of 25-64 has no postsecondary education credential (source: U.S. Census Bureau, 2004).

Affordability

> "There is little to no information on why costs are so high and what we're getting in return." — Secretary Spellings

Tuition continues to outpace inflation, health care costs and family income levels. While funding for Pell Grants has increased nearly 50 percent over the past five years, the financial aid system remains in urgent need of reform. We must streamline the process to help students and families prepare, plan and pay for college.

The Secretary's proposal:

- Simplify the process by partnering with states to use existing income and tax data to help students complete the Free Application for Federal Student Aid (FAFSA) in half the time.
- Notify students of their estimated aid eligibility before spring of their senior year in high school.
- Work with Congress to provide new funds for need-based aid through the federal financial aid system.
- Commission an independent management consultant review of the federal financial aid system.
- Revitalize the Fund for the Improvement of Postsecondary Education (FIPSE) to promote innovation and productivity.
- Encourage organizations that report annual college data to develop consistent affordability measures.

Facts and Findings:

> "Too many students are either discouraged from attending college by rising costs, or take on worrisome debt burdens in order to do so." — Commission on the Future of Higher Education

- From 1995 to 2005, average tuition and fees at public four-year colleges and universities rose 51 percent after adjusting for inflation (for private schools, the increase was 36 percent).
- Median debt levels among students who graduated from four-year colleges and universities were $15,500 for public and $19,400 for private institutions.
- State funding growth for higher education has fallen to its lowest level in over two decades.

Accountability

> "No current ranking system of colleges and universities directly measures the most critical point—student performance and learning." — Secretary Spellings

In the Information Age, it is essential that clear, comprehensive and comparative data about colleges and universities be collected and made available to students, parents, and policymakers.

The Secretary's proposal:

- Work with a consortium of states to build on and link together the 40 existing, privacy-protected higher education information systems.
- Explore incentives for states and institutions that collect and report student learning outcome data.
- Convene members of the accreditation community to recommend changes to the standards for recognition that will place a greater emphasis on results.
- Redesign the Department of Education's college search website to allow consumers to weigh and compare institutions based on their individual interests and needs.

Facts and Findings:

> "Because data systems are so limited and inadequate, it is hard for policymakers to obtain reliable information on students' progress through the educational pipeline."
> — Commission on the Future of Higher Education

- The U.S. college attainment rate has fallen to 12th among major industrialized countries (source: Organization for Economic Cooperation and Development).
- Total per-student expenditures for higher education averaged over $22,000 annually in 2001, almost twice the average of other major industrialized countries.
- The percentage of college graduates deemed proficient in prose literacy (able to read and extrapolate from a complex text) has declined from 40 to 31 percent in the past decade (source: National Assessment of Adult Literacy).

(1) From the ed.gov website at:
http://www.ed.gov/about/bdscomm/list/hiedfuture/actionplan-factsheet.html.
see the entire report (pre-publication copy) at:
http://www.ed.gov/about/bdscomm/list/hiedfuture/reports/pre-pub-report.pdf

Editor's Note: This study determines a significant correlation between three predictors of success in online learning. A large study population and exemplary design provide convincing support for the findings and conclusions.

Can Factors Related to Self-Regulated Learning Predict Learning Achievement in Undergraduate Asynchronous Web-based Courses?

Paul D. Bell, Duane Akroyd

Abstract

This study examined the effect of self-regulated learning (SRL) on individual learner levels of academic achievement in Web-based learning environments while holding constant the effect of computer self-efficacy, reason for taking an online course, and prior college academic achievement. The study constituents included 201 undergraduate students enrolled in a variety of asynchronous Web-based courses at a university in the southeastern United States.

Data was collected via a Web-based questionnaire and subjected to the following analyses: exploratory factor analyses of the self-regulated learning question items, correlations between the independent variables and the dependent variable, and linear regression of final course grades with all the variables in the model.

Analysis of the data revealed that three independent variables (GPA, Expectancy, and GPA_Exp) were significant predictors in the model of learning achievement in asynchronous online courses. Discussion of the study's predictive model follows.

Keywords: self-regulated learning, asynchronous Web-based learning, online learning, expectancy for learning, regression analysis, learning achievement.

Introduction

Increasingly, public institutions of higher learning are adding asynchronous Web-based instruction to their undergraduate degree programs. Although online learning has been hailed as the next revolution in access to higher education, many undergraduate learners (late adolescent students between the ages of 18 and 25 years of age) who function well in traditional on-campus classrooms may not be ready for the demands of asynchronous Web-based learning (AWBL). This is because online learning requires more learner control and self-direction than traditional classroom-based instruction. These demands are representative of higher levels of intellectual development that "may well be unattainable during the late adolescent years".[1]

There is little research from the asynchronous online learning literature that examines the relationship between learner control and self-monitoring and successful learning in AWBL environments. However, recent research in educational psychology has identified self-regulation of learning as a key characteristic that appears to be related to academic success in learner-controlled environments such as online courses. [2-4]

Self-regulated learning (SRL) is an element of social cognitive learning theory that states that learner behaviors and motivations as well as aspects of the learning environment affect learner achievement.[5-7] Some experts have argued that self-regulation of learning (SRL) has a positive influence on academic success.[8-12]

The majority of the SRL research literature is composed of theoretical work that has made convincing arguments for why SRL *should* influence learner achievement. On the other hand, empirical studies een conducted in both traditional classroom and computer-based settings have yielded limited results concerning the effects of SRL on student achievement.

Purpose of the Study

There are relatively few studies that have used predictive modeling in order to explain the effect of self-regulated learning (SRL) on learner achievement in asynchronous Web-based environments. In addition, these investigations have varied in the number and types of covariate factors included in the final models. For example, the asynchronous online learning literature indicates that other factors such as reason for taking an online course, self-efficacy for using computer technology, and prior academic achievement influence learning achievement in online courses.

The purpose of the current study, then, was to examine the effect of SRL on individual levels of achievement in an asynchronous Web-based learning environment while controlling for the effects of the covariate factors listed above.

Research Question

The research question was as follows: What is the predictive ability of self-regulated learning, reason for taking an online course, computer self-efficacy, and prior academic achievement (GPA) on final grade in asynchronous undergraduate online college courses?

Participants

The site of the present study was a coeducational public university situated in the southeastern region of the United States. According to registrar records, approximately 2,700 students were enrolled in Web-based undergraduate courses at the university. About a quarter of this group, 629 students, was selected via a random numbers procedure to receive a recruitment e-mail. Finally, 201 individuals from this group completed the study questionnaire. Students ranged in age from 18 to 50 with a mean age of 22.4 S.D. 6.14. Survey respondents were 77 percent female (n = 155) and 23 percent male (n = 46) and comprised a diverse ethnic sample with 74 percent Caucasian, 16.5 percent African American, and 5 percent Native American. The remaining 5 percent of the sample self-reported as either Asian American/Pacific Islander, mixed race, or Hispanic. Of the students sampled, 46 percent (n = 93) had no prior experience taking online courses, while 54 percent (n = 108) had taken at least one online course previously.

Data collection occurred during the spring 2005 academic semester.

Materials

Data was collected via a Web-based self-report inventory consisting of question items designed to assess participant ratings on the variables that were the focus of current study.

A review of the theoretical research in SRL showed that individuals must display certain fundamental attributes in order to be successful self-regulators of their learning. These include: (a) being intrinsically motivated to reach goals, (b) expecting that one's efforts to learn will result in positive outcomes, (c) expecting to succeed in one's learning, (d) being confident in one's ability to perform and complete an academic task, (e) monitoring one's progress toward goal completion, (f) controlling one's effort and attention, and (g) managing time and place resources for learning and studying. Self-regulated learning theory argues that these conditions must be present before students can successfully employ cognitive strategies in their learning. Moreover, according to Pintrich, Smith, Garcia and McKeachie (1991),[13] the Motivational Strategies for

Learning Questionnaire (MSLQ) scales "are designed to be modular and can be used to fit the needs of researchers." Therefore, 24 Likert-scaled question items were taken from the MSLQ to assess participant ratings on self regulated-learning subfactors targeted by the current study.

The survey instrument also included questions related to the covariates as follows: (a) two Likert-scaled question items were included that referenced the study participants' self-efficacy for computer usage, and (b) a short answer question item was included that referenced the study participant's reasons for taking the online course, and (c) each participant's grade point average (GPA) was collected from university registration records. Last, final course grades fell on a scale from 0–100 and were collected from course instructors at the end of the exam period. Permission to gather this information was obtained from each study participant. Please see Appendix A for a list of the question items from the study survey.

Methods and Designs

A cross-sectional predictive study was used in order to examine the effect of the following factors on learning achievement in asynchronous online undergraduate courses: (a) subfactors of self-regulated learning, (b) self-efficacy for computer technology, (c) reason for taking a Web-based course, and (d) prior college academic achievement.

The following steps describe how the data was analyzed to reveal the predictive ability of the SRL subfactors on academic achievement.

1. Despite published claims of validity and reliability for the original instrument,[13,] the first step was to run a factor analysis of the self-regulated learning question items in order to establish their factor structure in the current study. Factor internal reliability coefficients obtained for the self-regulated learning subfactors were then compared with those obtained for the original instrument.
2. Next, a correlation matrix of the independent variables (the SRL subfactors as well as the study covariates) and the dependent variable was generated. An analysis of the matrix determined which of the independent variables were correlated with the dependent variable and which were correlated with each other.
3. Finally, a multiple regression analysis of the predictor variables in the proposed model with the dependent variable (final course grade as a measure of learning achievement) was performed.

Results

While students from all four class levels participated in this study, juniors and seniors accounted for about two-thirds (64.7 percent) of the sample. Final course grades ranged from 0–100 ($M = 86.36$, $SD = 13.31$) with 55.7 percent earning a grade of 90 or above. GPA of the sample population ranged from 1.00–4.00 ($M = 3.00$, $SD = 0.63$). It is possible that previous experience with learning online could have had an impact on the study's results. Therefore, an independent samples t test was used to determine whether there was a significant difference in learning achievement (mean final course grade) between those students who had never taken an online course before and those students who had already taken at least one online course. This analysis revealed that there was no significant difference between the two groups ($t(199) = 1.4$; $p = 0.17$).

Exploratory factor analysis of the self-regulated learning survey items yielded the following factor structures: three subfactors—expectancy, intrinsic goal orientation, and resource regulation. These subfactors paralleled those yielded by the original instrument and their reliability estimates can be compared to their counterparts in the original instrument. Please refer to Table 1.

Table 1

Means, Standard Deviations, Intercorrelations, and Coefficient Alpha Reliability Estimates

Variable	M	SD	1	2	3	4	5	6
Final Grade	86.36	13.31						
GPA	3.01	0.63	.40***					
Computer Self-Efficacy	6.38	1.18	-.09	-.25***	(70)			
Intrinsic Goal Orientation	13.11	3.11	.10	.03	.07	(62)[74]		
Eff/Resource Management	30.83	6.02	.32***	.25***	.09	.28***	(80)[73]	
Expectancy	23.50	3.88	.39***	.30***	.10	.23**	.50***	(85)[81]
GPAXExpectancy	71.08	20.56	.52***	.84***	-.13	.15*	.45***	.66***

Note. N = 201. Reliability estimates appear on the diagonal. Estimates in parentheses are for the current sample after factor analysis, those in brackets are from original researchers' instruments.

*p< .05, **p< .01 , ***p< .001

Survey participants fell into three categories according to their reason for taking an online course during the spring 2005 semester. Of the respondents, 47.8 percent (n = 96) stated that learning online was more convenient for them than taking a traditional face-to-face course, while 33.8 percent (n = 68) reported that they had no option. "No option" meant that at the time the student registered, either the course was only offered online or there were no face-to-face course sections available. A smaller number of students, 18.4 percent (n = 37) gave a reason related to their curiosity or interest in learning via the electronic medium. See Table 2.

Table 2

Final Grade Based on Reason for Taking the Course (N = 201)

Reason	*n*	*M*	*SD*	Low	High
Convenience	96	84.83	15.97	0	100
No Other Option	68	87.75	8.46	63	100
Interest in Online Learning	37	87.78	12.86	31	99

Student responses to two survey questions about self-efficacy for the use of computer technology were added together and the sum represented the student's overall self-report score for computer self-efficacy (M = 6.38, SD = 1.18). Prior academic college achievement was measured using the current semester GPA. The mean GPA for the sample was 3.01 and the SD 0.63. See Table 1.

Interaction term. In the current study, GPA and expectancy for learning were found to be moderately correlated (r = .3) (see Table 1). This r value as well as literature-based evidence for their positive correlation[5,7,14-17] drove the decision to create an interaction term, consisting of the cross product of the variable that measured prior college academic achievement (GPA) and the variable that measured individual expectancy for learning (ExpSE_sum). This new variable was labeled GPA_Exp and was included in the predictive model.[18]

Mean standard deviations, Pearson correlations, and coefficient alpha reliability estimates for the study's independent variables appear in Table 1. Coefficients ≥.1 were considered indicative of a correlation between a particular predictor variable and the dependent variable. Therefore, based on this criterion, the following bivariate correlations revealed five predictor variables significantly related to learning achievement: (a) interaction of GPA and expectancy (r = .52), (b) prior college achievement as measured by GPA (r = .40), (c) expectancy (r = .39), and (d) effort regulation (r = .32. All of these correlations were significant at least at $p < .05$, and all were in the predicted directions.

Using multiple regression, final course grades were regressed on the linear combination of all the variables in the model. These seven variables included (a) prior academic achievement (GPA), (b) computer self-efficacy (Comp_SE), (c) intrinsic goal orientation (IGO_sum), (d) resource management (TPEffreg), (e) expectancy (ExpSE_sum), (f) reason for taking an online course (reason_ol), and (g) the interaction between GPA and expectancy (GPA_Exp). Table 3 depicts the prediction of final grade based on the full model.

Table 3

Prediction of Final Grade Based on the Full Model (N = 201)

	b	**SE**	**β**	***t***	***p***
Intercept	-74.91	26.64		-2.81	.005
Grade Point Average	43.80	8.92	2.09	4.91	.0001
Computer Self-efficacy	-0.21	0.67	-.02	-0.32	.75
Intrinsic Goal Orientation	-0.07	0.25	-.01	-0.26	.80
Resource Management	0.10	0.15	.05	0.69	.49
Expectancy	5.66	1.06	1.65	5.33	.0001
Reason_ol	2.29	1.51	.09	1.51	.13
Grade point average X Expectancy	-1.52	0.36	-2.35	-4.22	.0001

Full Model: F 7, 193 = 17.12, p = .0001. adj R^2 = .361.

The linear combination of the independent variables significantly predicted final course grade in asynchronous undergraduate online courses (adj. R^2 = .36, p<.001). See Table 3. Three of the seven independent variables were significant (P<.0001) predictors of undergraduate learning achievement in asynchronous online courses; these predictors were prior college learning achievement (GPA), expectancy for learning (ExpSE_sum), and the interaction of prior college learning achievement with expectancy for learning (GPA_Exp).

The magnitude of contribution for each significant predictor was determined by its associated standardized regression coefficient (Table 3); they were GPA (2.1, p<.0001), expectancy (1.7, p<.0001), and GPA_Exp (-2.3, p<.0001). The differences between the absolute values for these three coefficients did not appear to be widely divergent. Thus, it appeared that none of these three independent variables had a greater effect than the others in predicting the dependent variable.

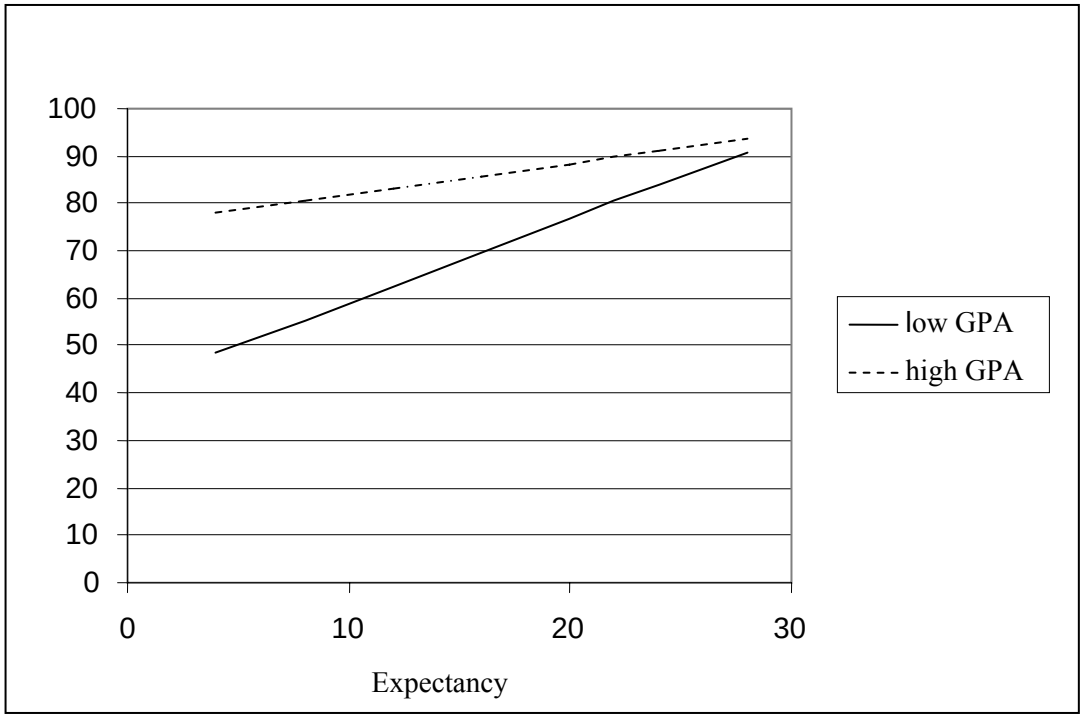

Figure 1. Relationship of Expectancy and Final Grade where GPA is Low (below the median) and where GPA is high (above the median).

Interaction term. Figure 1 compares the relationship between the independent variable (Exp) and the dependent variable (Fin Gr) where GPA is low (below the median) and where GPA is high (above the median). This figure demonstrates that when GPA is below the median, the slope of expectancy for learning on FinGr is steeper than when GPA is equal to or greater than the median. This suggests that expectancy for learning exerts a greater effect at lower values of GPA than it does at higher values of GPA. Furthermore, this figure also suggests that GPA's impact on final course grade is mitigated at higher levels of expectancy for learning.

Conclusion

In this study, the best predictors of learning achievement in undergraduate asynchronous online courses were prior college academic achievement (GPA), expectancy for learning (ExpSE_sum), and the interaction term based on the cross product of prior academic achievement and expectancy (GPA_Exp). In addition to being the most important independent variables in the model, these three variables also correlated most strongly with the dependent variable compared to other independent variables in the model.

The study's results yielded a parsimonious solution to the original study research question and indicated that although there were several SRL sub factors that were bivariately correlated with

learning, only one turned out to be a predictor of learning achievement in asynchronous online undergraduate courses. For example, although effort regulation was fairly correlated with FinGr (r = .32), it was more highly correlated with the other self-regulated learning subfactor, expectancy (r = .50). Therefore, it appears that effort regulation probably shared variance in common with expectancy and, as a result, was a weaker predictor of final grade than was the expectancy for control of learning subfactor. As a result, expectancy acted as an "umbrella" term that represented the other SRL correlates of the dependent variable (FinGR) in the predictive model of learning achievement in asynchronous online undergraduate courses.

This study's findings suggest that expectancy, or an expectation that one will experience positive outcomes in one's learning, is a central driving force for self-regulation.[16, 19] Moreover, Bandura and others have underscored the role played by individual self-efficacy in facilitating expectancy for learning.[14, 20] Therefore, an individual with strong expectancy for learning possesses the "can do" attitude required to succeed in learning. Such an attitude is the product of positive reinforcement and explains the mutually positive or synergistic relationship not only between prior academic achievement and expectancy, but also between expectancy and other self-regulated learning subfactors.

For example, it would appear that because expectancy was the only subfactor to make it into the predictive model, it acted as a global factor or "proxy" that represented the other SRL sub-factor (effort regulation) in the predictive model. This observation is reasonable because strong expectancy for learning depends on having other positive attitudes and behaviors consistent with success in learning. It is as though once an individual expects positive outcomes for his learning and takes responsibility for his learning, he will do what it takes (such as regulate his effort accordingly and apply appropriate time and study management strategies) in order to be a successful learner.

Thus, it is unlikely that a multiple regression equation that already contained expectancy would need other variables like effort regulation in order to improve the accuracy of its predictive power; any variance in final grade due to effort regulation had probably already been accounted for by expectancy. As a result, the effort regulation variable was redundant and consequently displayed a non-significant beta weight.

College has traditionally been a stage of education where individuals must assume greater responsibility for their learning compared to the primary and secondary schooling experiences.[21, 22] Moreover, today's college student is faced with an even greater need to be able to assume responsibility for his learning because more undergraduate courses and programs are being delivered via asynchronous online environments. This study's findings suggest that individuals with the greatest expectancy for learning, regardless of their prior academic achievement, were the most successful asynchronous online learners. Nevertheless, expectancy for learning appears to be a learner characteristic that is molded and shaped by previous academic learning experiences.[14, 19, 23] Therefore, in order to ensure academic learning success, it behooves responsible educators to ensure that students who enter college are armed with strong expectancy for controlling their learning.

Recommendations for Future Research

1. Employ other research methodologies in order to study the role that SRL plays in explaining learning achievement in online courses. Researchers are calling for mixed methods research because the SRL construct, is recognized as a complex entity and, as such, may require a range of methodologies in order to better understand its influence on learning.[21, 24] For example, it is known that triangulation of qualitative and quantitative methods can help confirm a theory to a greater degree than can either method used in isolation.[25] Thus, findings

from both quantitative research methodologies based on survey data collection and qualitative research strategies based on interviewing and observation can help to either confirm or contradict hypotheses regarding the connection between self-regulated learning and learning achievement. Therefore, a future replication of this study should include qualitative as well as quantitative techniques of data collection and analysis.

2. Prior learning experiences influence individual expectancy for control of learning. Therefore it is important to investigate how factors external to the learner may facilitate expectancy and self regulation of learning. For example, future studies of learner achievement in asynchronous online courses can be designed to investigate how instructor and/or instructional design factors may impact self regulation of learning and learner achievement.
3. Finally, repeat this study with a larger sample of undergraduate students. As more undergraduate programs move toward online course delivery, it is useful to understand which learner-associated factors influence learning achievement in asynchronous Web-based courses.

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Appendix A

Undergraduate Online Survey

Demographic items

1. What is your e-mail ID?
2. Gender: Male, Female
3. Age_____
4. Ethnic background (Non-Hispanic Black, Hispanic, Non-Hispanic White. Asian/Pacific Islander, Native American, Mixed Race)
5. Class level (freshman, sophomore, junior, senior)
6. What is the name and section number of the Web-based course that you are taking this semester? (if taking more than one course, complete this for the course that is required for either a major or minor course of study).
7. Is this course taught 100 percent online with no scheduled on-campus sessions?
8. Why are you taking this course online as opposed to in a campus-based classroom?
9. The item that best describes how I feel about my ability to overcome computer- and technology-related problems:
    1. Not at all confident
    2. Somewhat confident
    3. Confident
    4. Very confident
10. The item that best describes how I feel about my ability to use computer technology such as the Internet, e-mail, and chat:
    1. Not at all confident
    2. Somewhat confident
    3. Confident
    4. Very confident

Self-regulation of Learning Items

Please indicate how true each of the following statements is of you. There are no right or wrong answers, just answer as accurately as possible. Use the scale below to answer the questions. If you think a statement is very true of you, select "7"; if a statement is not at all true of you, then select 1. If the statement is more or less true of you then find the number between 1 and 7 that best describes you.

1 2 3 4 5 6 7

Not at all true of me Very true of me

11. In a class like this, I prefer course material that really challenges me so I can learn new things.
12. If I study in appropriate ways, then I will be able to learn the material in this course.
13. I believe I will receive an excellent grade in this class.
14. During the times that I am logged onto the course site, I often miss important points because I am thinking of other things.
15. I usually study in a place where I can concentrate on my course work.
16. I often feel so lazy or bored when I study that I quit before I finish what I planned to do.
17. I prefer course material that arouses my curiosity, even if it is difficult to learn.
18. It is my own fault if I don't learn the material in this course.
19. I'm confident I can do an excellent job on the assignments and tests in this course.
20. When I become confused about something I'm reading for class, I go back and try to figure it out.
21. I make good use of my study time for this course.
22. I work hard to do well in class even if I don't like what we are doing.
23. The most satisfying thing for me is trying to understand the content as thoroughly as possible.
24. If I try hard enough, then I will understand the course material.
25. I expect to do well in this class.
26. I often find that I have been reading for class but don't know what it was all about.
27. I find it hard to stick to a study schedule.
28. When course work is difficult, I give up or only study the easy parts.
29. When I have the opportunity, I choose course assignments that I can learn from even if they don't guarantee a good grade.
30. If I don't understand the course material, it is because I didn't try hard enough.
31. Considering the difficulty of this course, the online format, and my skills, I think that I will do well in this class.
32. I try to think through a topic and decide what I am supposed to learn from it rather than just reading it over when studying.
33. I rarely find time to review my notes or readings before an exam.
34. Even when course materials are dull and uninteresting, I manage to keep working until I finish.

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Editor's Note: In October of 2005, Bruce Mann published Part 1 of this study, Making your own educational materials for the Web, in this Journal. Part II draws upon an extensive body of research in learning from images and sounds to develop a cognitive structure and design model called the Sound Structured Function or SSF model. This model is based on learning mechanism for sound and images and differentiates between learning in childre3n and adults.

Making Your Own Materials, Part II: Multimedia Design for Learning

Bruce L. Mann

Abstract

Part II of *Making Your Own Materials* describes a cognitive structure for learning from multimedia and a design model, both of which rely on the durability of sound and its natural resistance to interference and forgetting. The cognitive structure is called the attentional control definition of multimedia learning, the design model is called the SSF model.

Keywords: learning, attention, multimedia, SSF model, instructional design, audio, modality.

Multimedia Learning

Learning from multimedia begins when an adult or child watches a graphic or animation, listens to speech, some music or a sound effect, reads some text, focuses his or her attention to learn and send data to and from their long-term memory. Figure 1 is an illustration of the cognitive structure of learning from multimedia.

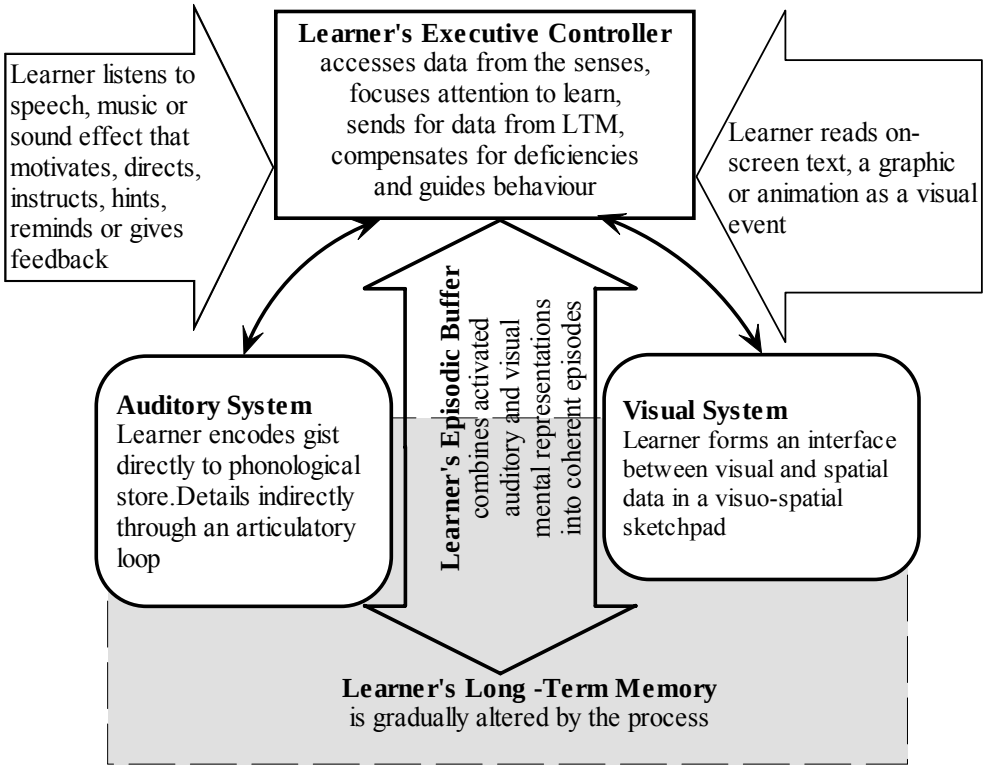

Figure 1. The structure and process of learning from multimedia according to the attentional control definition of multimedia learning.

Acoustic Image

From listening to a school bell, warning, or hint from a pedagogical agent or teacher's website, the student encodes its meaning or *gist* (Brainerd & Reyna, 1990; Estes, 1980; Hildyard & Olson, 1982; Reyna, 1992; Tannen, 1985) as an *acoustic image* (Baddeley, 1986, p. 44) directly into his or her phonological store as a coherent episode (Baddeley, 2002). Types of multimedia *sound* includes effects, music or utterances (human or computerized) that can be played from a tape or digitized file, or presented by a talking coach or agent in a computer application or website, a voice-over IP, or pod cast. Acoustic images from sound effects, music and utterances are encoded directly by the student and become more durable and resilient to forgetting than visual traces. "There is clear evidence that short-term memory for material presented in the auditory mode is considerably more durable and resistant to interference from other modalities than is visually-presented material" (Broadbent, Vines & Broadbent, in Baddeley, 1986, p. 42). Further some acoustic images evoke responses in visual areas of the brain, especially in young children (Goswami, 2004). Consider the study by O'Leary and Rhodes (1984) who reported that when babies listened to an audio recording of one woman from a speaker located halfway between two videos of different women speaking simultaneously, the babies preferred to watch the face that belonged with the voice they were hearing. The babies shifted their attention until they associated the auditory and visual events.

Inner Eye

From watching a visual event in multimedia, students form their own interface between the spatial and visual data in visual-spatial memory by re-sketching the graphic or animation through their own visual system, like an *inner eye.* Types of *visual event* include sketches, diagrams, static or animated photographs, pictographs, films or video clips, static or moving images, animated gifs, cartoons or computerized tutors, coaches or mentors (human likeness or cartoon), appearing as avatars or agents (static or moving).

Inner Voice, Inner Ear

Whereas sound effects, music and utterances are directly encoded into a phonological store, reading instructions and feedback require mental articulation by the reader. Multimedia learning is dependent on reading and listening, yet reading is not the same as listening, extracting different information from each store by the student's attentional control system. Analysis of text by the student is first fed into the phonological store by means of sub-vocal speech using an articulatory system, like an *inner voice to an ear inner* (Baddeley, Gathercole, & Papagno, 1998). The loop plays a crucial role in syntactic learning as well as in the acquisition of the phonological form of lexical items. "The loop system mediates the acquisition of syntactic knowledge, as well as the learning of individual words… not to remember familiar words, but to help learn new words (Baddeley, Gathercole & Papagno, 1998, p. 158, 166).

Whereas good readers can use their context-free word recognition skills, poor and beginning readers use repetitive sentence context. Poor readers gain more from context than good readers, consistent with Stanovitch's hypothesis (Goldsmith-Phillips, 1989; Nickerson, 1991; Yeu & Goetz, 1994). Young and beginning readers especially, rely on context to read (Goldsmith-Phillips, 1989), showing a heavy reliance on contextual facilitation of word perception because they are less adept at contextual facilitation of comprehension than children in the higher grades, in accordance with Stanovitch's (1980) interactive-compensatory hypothesis. Young children are not fully capable of mentally articulating instructions and feedback presented in text. Their auditory memory consists of a phonological store without a phonological loop (Gathercole, Pickering, Ambridge & Wearing, 2004). Unarticulated material in young children is analogous to extraneous cognitive load reported in adults (Kalyuga, Chandler & Sweller, 1999; Mayer, Heiser

& Lonn, 2001; Sweller & Chandler, 1994). However, when young students read difficult or unfamiliar text they articulate the sound of the words to "hear" themselves say the words. They may experience the common side-effect of a dry throat from sub-vocalizing the sound of words or phrases to be heard by the inner voice. This reliance on reading context decreases as a function of reading development and ability (Goldsmith-Phillips, 1989; Swantes, 1991).

Reports like these about the durability of sound and its resistance to interference and forgetting provide support the inclusion of sound in learning from multimedia, especially in poor readers and young children. However, multimedia learning is more than synaptic responses to sensory stimulation, sound *per se* is not sufficient to consistently affect learning from multimedia. Student enjoyment of multimedia is either uncorrelated or negatively correlated to learning outcome (Clark, 2001; Clark & Feldon, 2005). Unlike entertainment multimedia, educational multimedia requires reading and listening to instructions and feedback presented in the program or website. Sound must have a purpose or function with the visual events. Given a purpose or function, sound can alert, caution, warn, remind or direct the student to a visual event displayed by a computer program or Internet site. Although sound prompting is permitted direct access to the student's phonological store, sound *per se* is not sufficient to consistently effect learning from multimedia. For that reason, the SSF model is distinguished from stochastic roles for sound (in Mann, 1997a). Stochastic sound roles employ a hit-and-miss approach to sound design that describes students' learning as a function of the playback technology instead of focus attention for long-term learning.

SSF Model

The structured sound function (SSF) model was designed for the teacher or instructional designer to develop a working structure of auditory events with the primary purpose of helping students to control their attention in multimedia (Mann, 1992, 1995a, 1995b, 1997a, 1997b, 2000). The SSF model is comprised of five functions and three structures that when combined, can help students to focus their attention on important visual events in multimedia. Figure 1 shows an illustrated sound design rubric for structuring a sound function with visual events to help students to control their attention.

Sound Function

According to the SSF model, five functions are conceptualized for sound as descriptions of character, place, time, and subject matter when assigned to any visual event displayed in multimedia.

Temporal sound

A *temporal sound* is an alert, caution, warning or direction about a future event, or a reminder about a past event that is displayed as a visual event in a computer program or at an Internet site. Some examples of temporal sound cueing include: instruction, navigational direction, hinting, feedback and reminders.

POV sound

A *point of view (POV) sound* describes a particular perspective toward adding sound to help learning from multimedia. When an objective, subjective or performer point of view is presented in sound, it can imply another point of view or more information about the point of view than what is stated or implied in the visual event. Alternatively a POV sound can be prescribed within a character's personality, showing internal conflict between objective, subjective and performer points of view. POV sound can also be made to differing opinions about political performers, or deeply felt moral, cultural or religious beliefs.

	< Structuring the sound with a visual event >		
	The goal: is convergent or divergent	**The constancy:** is continuous or discontinuous	**The density:** is massed, spaced or summarized
< Giving the sound a function >			
A temporal prompt: that cues that counterpoints that dominates that undermines			
A point of view: objective, subjective, performer, political, socio-cultural			
A locale: real, imaginary			
An atmosphere, feeling, mood			
A character's: past, future, personality			

Figure 2. The SSF model, a design rubric to help students focus their attention on visual events presented in multimedia

Locale sound

A *locale sound* can fill an informational role when it is associated with a visual event presented in a video clip, graphic, or a paragraph of formatted text. Most often familiar sounds are added to establish a place, real or imaginary. Locale sound in public spaces can transform a passive experience into an active one through an earpiece. Mobile technology can offer users in a city or historic site, or at a public event, a more comprehensive understanding of their surroundings.

Atmosphere sound

Atmosphere sound can provide the context for an event for the listener/viewer in the absence of visual information. A broadcast journalist using streaming technology over the Internet can for

example, verbally provide an eyewitness account of a scene after-the-fact. Similarly a voice-over plus a map or photo of the speaker will suffice in lieu of visual evidence of the event.

Atmosphere sound can also provide a *feeling* about a human condition. Still other times, atmosphere sound can set the *mood,* as in a celebration or political meeting. Atmosphere sound can easily be misused however, by manipulating the structure of the sound-visual relationship. In a major CD project, for example, where a range of sounds were integrated as the students navigated the information, a student made a choice to see more detail about Thailand and a short musical track was played. The student commented that the sound was not Thai music and decided that the remaining information would not be useful" (Sims, 2006. p 5). Juxtaposing inappropriate music or laughter over a visual event therefore, can undermine the original intent.

Character sound

A *character sound* refers either to a character's past, future, or personality, real or virtual. Personality sound refers to the subtext, story spine or tragic flaw in a character. Like personality sound, the character's past or future sound contains auditory references to a character's personal, private or public event or idea. Unlike personality sound however, this function does not plumb the depths of the character's psyche.

Structured Sound

Structuring the goal, constancy and density of a sound with a visual event during multimedia learning is a method of associating sound with a visual event. The process is analogous to describing a scientific process or telling a story. The goal of a sound can be either convergent or divergent. The constancy of a sound describes its duration and is either continuous or discontinuous. The density of a sound is the recurring alternation of contrasting idea elements presented as an auditory warning, music or speech and is either massed, spaced or summarized. Of the three structural components, selecting the goal and the constancy are most important. . Discontinuous sound may be sufficient for an easy task or an unfamiliar item. On easy tasks or with familiar items, a student will implement automatic processing (Schneider & Shiffrin, 1977) also known as pre-attentive processing (Treisman, 1986). Pre-attentive processing of easy tasks or familiar items occur in parallel; that is they can handle two or more items at the same time. Under these conditions discontinuous sound may suffice. An example of a continuous temporal reminder would be the repetitive squealing of monkeys in Millie's Math House (EdMark, 1995) when there is no student input.

Prescribing sound for a novice is best served with a convergent goal and continuous constancy. Continuous sound may be especially needed for a difficult task or with an unfamiliar item. On difficult tasks or with unfamiliar items the student must consciously control their mental processing (Schneider & Shiffrin, 1977) to focus their attention (Treisman, 1986). Under these conditions, attention focusing becomes serial; only one task is processed at a time. Learners must consciously focus their attention "to bind the separate features of a stimulus- such as the colour, shape, words, into a unitary object" (Matlin, 1989, p. 57).

To engage the appropriate attentive state, the student must self-initiate the appropriate system of information processing (Borich & Tombari, 1995). Sometimes working memory simply is incapable of highly complex interactions using novel (i.e., not previously stored in long-term memory) elements.

Selecting a temporal sound

Selecting a *convergent goal* for a temporal sound can help the student to shift his or her attention to a visual event. One example of a convergent goal is a spoken direction about how or where to look to find out how to create a personal objective, or learning outcome to answer a question. An

example of a divergent goal for temporal sound is a procedural question spoken during a brainstorming task, such as the spoken reminder to 'click and fully explore' the multimedia environment or website. A *divergent goal* for sound would deviate, elaborate, or even contradict a visual event. In selecting a temporal sound for novices (i.e., for difficult of unfamiliar task, or poor or beginning readers) use a convergent goal and continuous constancy. That is, using a hint or reminder can cue the student frequently to take action with the information presented in the visual event. The cue might request that the student write or draw something, or discuss an issue with their peers on site or online. When the temporal sound is massed it means that the auditory alert, caution, warning or direction is concentrated within one part of the multimedia program or website. A massed temporal sound occurs during early interaction with the program or website, similar to a news pre-cap, headline or advance organizer. A spaced temporal sound alerts, cautions or reminds the user, such as incoming chat or email. A summarized temporal sound repeats the substance of a longer discussion, like the recap in a television news story.

Selecting a POV sound

Selecting a *convergent goal* for POV sound aims to resolve a conflict between objective, subjective and performer points of view. An example of a convergent POV sound is in *Getting Along*, a social learning computer program. A divergent goal for a POV sound is an unresolved difference of opinions among political performers, or among those with deeply felt moral, cultural or religious beliefs. An example of a divergent goal for a POV sound would that generated in the *Decisions, Decisions: The Environment* (Tom Snyder Productions Inc, 1997) where students learn and apply the lessons of history through role-playing simulation software. Selecting a POV sound for novices requires a convergent goal and continuous constancy. Continuous POV sound is usually a diversity of spoken comments about a visual event. An example would be a lively debate. Discontinuous POV sound can be a distinctive sound that may be a laugh or interruption that reflects a particular opinion. An example would be an infrequent remark that affects the interaction within the multimedia experience. When the POV sound is massed it is typically an auditory interlude or introduction to an event according to an objective, subjective or the performer's perspective. A summarized POV sound is usually an auditory re-cap or wrap-up of an event according to an objective, subjective or the performer's perspective. A spaced POV sound is typically an auditory reminder through an event.

Selecting a locale sound

Selecting a *convergent goal* for a locale sound would immediately reveal the environment or learning context of the multimedia environment. Selecting a continuous locale sound for novice end-users would require a frequent reminder of the environment or learning context. Frequent reminders would preempt the need to explore the context thereby allowing closer engagement with the visual events.

Selecting an atmosphere sound

Selecting a *convergent goal* for an atmosphere sound aims to provide a desired feeling in the novice user. Selecting a continuous atmosphere sound for a novice would mean unchanging and distinctive recurring messages, warning signals or a musical leitmotif.

Selecting a character sound

Selecting a convergent goal for a character sound aims to restrict the character's role to something in his or her past or future, or a notable aspect of the character's personality. Selecting a continuous character sound for a novice describes an ongoing auditory effect, music or utterance (human or computerized) such as a tutor or mentor's voice that identifies, signifies or personalizes a visual event.

SSF Research

SSF research with graduate students and pre-service teachers learning instructional design (Mann, 1988, 1994, 1995b, 1997b), 7th graders learning fractions (Adams, Mann & Schulz, 2006), 7th graders learning combustion (Mann, Newhouse, Pagram, Campbell & Schulz, 2002), and with 4th and 5th graders learning grammar (Mann, Schulz & Cui, in press) has been promising. Under most conditions, the long-standing need described in the literature for purposeful advice on how to enhance multimedia learning (Barron & Kysilka 1993; Blyth 1960; Buxton 1989; Mayer 2001; Koroghlanian & Klein, 2004; Mayer 2001; Hartman, 1961) can be met with this model.

The SSF model is based on the attentional control definition of multimedia learning. The attentional control definition originated from reviews of the research in several disciplines that developed independently of one another, despite their common field of study (Kemps, De Rammelaere, & Desmet, 2000). Two of the most important influences are the general model of working memory (Baddeley, 1986, 2000; Baddeley & Andrade, 2000; Jefferies, Ralph & Baddeley, 2004) and the supervisory attentional subsystem model (Norman & Shallice, 1980; Shallice, 1982). Although influences do not target multimedia learning directly, they explain why sound is so critical to multimedia learning. According to these cognitive theories, sound is permitted direct access to the student's phonological store. Taken together the attentional control definition and the SSF model provide mutual support between the psychological description and educational design, analogous to a two-way street, as suggested in the literature (Mayer, 2003).

Research on the SSF model and coincidentally the attentional control definition on which the model is based however, is a departure from the standard position on multimedia learning research. The standard position in multimedia learning research in the literature at present is the cognitive theory of multimedia learning (Mayer 1997, 2001; Mayer & Moreno, 1998). Theoretical support for the cognitive theory of multimedia learning comes primarily from Paivio's (1986) dual coding theory, which distinguishes between two cognitive systems: verbal and nonverbal. The verbal system includes language and the nonverbal system includes mental imagery. Referential connections between the systems account for the evocation of mental images by language (or language by images). According to the cognitive theory of multimedia learning, meaningful learning occurs when a capable adult selects relevant information from each store, organizes the information into a coherent representation, and makes connections between corresponding representations in each store (Mayer, 1997, 2001).

Whereas the standard position of learning from multimedia has advanced our understanding about its impact on adults and provided an alternative to media comparison research (e.g., Bernard, Abrami, Lou, Borokhovski,Wade, Wozney, Wallet, Fiset & Huang, 2004; Clark & Feldon, 2005), there are shortcomings that reduce its applicability in education. First, this view of multimedia learning is based on experimental studies with adults (i.e., mostly undergraduate psychology majors), not children. Learning for young children is different from learning in adults. Young children are not simply little adults, not capable of reasoning as an adult until they reach the age of 15 (Piaget, 2000). Therefore claims about media effects based on the standard position in multimedia learning should be constrained to learning in adults. Second, instead of studying multimedia learning over several days or weeks as in the attention control definition, the standard approach has relied on impact studies, testing immediately following the treatment. Consequently the educational benefits of the standard position are not as apparent as they could have been had the research used delayed post-testing to examine learning effects over time, in accordance with Sweller's view (2004) for example, that the main purpose of instruction is to build knowledge in long-term memory. Third, although there is an ongoing initiative to investigate the quantitative effects of off-loading and weeding details from visual events and of increasing signals in sound (Mayer, 2002, 2003), the instructional designer may still be left guessing how much and how often to use sound and how much detail to leave in text, the graphic or animation.

Multimedia Learning and Instruction

The SSF model was designed for the teacher or instructional designer to develop a working structure of auditory events with the primary purpose of helping students to control their attention in multimedia (Mann, 1992, 1995a, 1995b, 1997a, 1997b, 2000). According to the traditional definition of *instructional design* (Reigeluth, 1983; 1999), the teacher uses instructional methods and media that are best suited to bring about changes in students' knowledge and skills. Authoring tools such as *Movie Maker* and *Photo Story* free to purchasers of *Windows XP* (MicroSoft Corporation, 2006) can be used to design your own multimedia in science, mathematics, music, language arts, social studies, and other subjects in the curriculum. The traditional definition however, excludes the student from the design process.

One alternative is to implement the SSF model in a constructional design wherein the teacher assumes the student to be an active, changing entity. Hannafin and Hill (2007) introduced the term *constructional design* to mean a learning environment that enables and supports a student by engaging them in design and invention tasks where knowledge-building tools are provided but concepts are not explicitly taught. Students take an active role in the design of their own educational materials.

A second alternative is that teachers and students work together on projects, such as the class or school website using the SSF model as a *job aid* to design their own multimedia. A job aid is useful in situations when it is not feasible or worthwhile to commit a procedure to memory. Job aids are often used instead of instruction to save time and money (Rossett & Schafer, 1991), when an individual or group must remember how to complete a task that is infrequently performed, or when the task must be accomplished exactly the same way every time (Boyd, 2005). The individual may understand the task, but the specific sequence of steps in completing the task may be esoteric or difficult to remember (Brown & Green, 2006).

Summary

Part II of *Making Your Own Materials* describes how students control their attention as they read and listen to multimedia. The SSF model is presented as a heuristic to help students to control their own attention as they read and listen to multimedia and endeavor to form links to their long-term memory. *Heuristic* is taken here in its functional sense, rather than the computer modeling sense (Bregman, 1989, p.32). It is likely that haptic events such as field experience or hands-on simulation, hand-sensing gloves or simulated reach-in-and-grab technologies that can be downloaded into content, computer applications for user interface navigation, will soon be incorporated into the SSF model. As evolving hardware and software attributes permit more adaptive and non-linear interactions and a higher capacity for differentiating sound from visual and haptic events, the SSF model will continue to be used as a heuristic by teachers and students to control attention, develop coherent episodes, and build the schema in long-term memory.

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Editor's Note: Brent shares his rich experience as researcher and practitioner to show how dialog should be responsive to students needs and promote genuine interaction.

Doctoral Students: Interactivity Experiences in Online Universities

Brent Muirhead

Introduction

The author will discuss the issue of interactivity in graduate online classes. The paper highlights information gleaned from surveys with three adult learners who are pursuing doctoral degrees. Interactivity studies and professional experiences with adult learners will offer insights into quality of their educational experiences.

Study Participants

The study participants were two males and one female who are married and range in age from the mid 50s to their early 60s. The individuals have extensive professional experience working in corporations and human services industries. They are veteran online university teachers who hold leadership positions in higher education. The survey was created for an assignment for a graduate course called Technology and Human Development at The Teachers College, Columbia University.

Importance of Interactivity

The virtual environment lacks the normal face-to-face interaction of the traditional classroom. It places a greater burden on students to utilize the appropriate instructional resources to understand the subject matter. Instructors must focus greater attention to effectively communicating expectations for assignments and sharing relevant lecture notes. Educational literature contains frequent references to the importance of interactivity. Berge and Muilenburg's (2005) research found that students considered the absence of social interaction as being the greatest barrier to positive online learning experiences.

The online setting holds potential for vibrant interaction and rich dialog. Unfortunately, online educational experiences can become quite wooden and lifeless at times, like a boring traditional classroom. Students can become disillusioned with the teaching and learning process when it lacks the personal touch of human interaction.

Interactivity Survey

The author developed a survey instrument based upon interactivity research studies. Distance education literature is slowly growing as more researchers are examining different aspects of the teaching and learning process. Reflective analysis of the 14 survey (see Appendix A) questions will highlight the study participant's perceptions of interactivity within the online environment.

The first three questions were designed to provide background information on the study participants. Two of the individuals are seeking doctoral degrees in management and organizational leadership and have taken five online doctoral courses. The other individual is studying psychology and has taken six online doctoral courses. The three students have taught extensively in the online environment in higher education. They represent a wealth of teaching experiences and professional expertise.

Distance education represents a new frontier and online universities are rapidly growing. The University of Phoenix serves a student population of over 300,000 students and half of these students take online classes (UOP Fact Book, 2005). Educators have raised concerns about the quality of the instructional experiences when there is no face to face interaction. A major challenge for online instructors involves creating a consistent level of interaction that fosters genuine learning and cultivates a community atmosphere. The study participants had serious concerns about the lack of personal interaction and shallow online discussions that hindered meaningful interaction within the classes. One study participant was extremely disappointed in the instructors of their five online courses:

> *"The facilitators are arbitrary, arrogant, non-existent, non-instructional and there is no constructive feedback provided. Because you cannot see them it is like the anonymous customer service phone call they are free to be nasty and there are no repercussions for their actions. Because there is a shortage of graduate facilitators the universities do not terminate the worst offenders. This lack of accountability and autonomy paints all with the same brush."*

The comment reflects how distance education schools can become victims of their own success by enrolling large numbers of students but failing to properly train and monitor their instructors. Distance education programs vary in the quality of their classes and some offer poor learning experiences characterized by poor course design, inappropriate content or sequencing of learning activities and inconsistent teacher feedback (Janicki & Liegle, 2001). "Those involved in distance education grossly underestimate the difficulty involved in changing deeply entrenched teaching and learning habits, and consequently we grossly underestimate the difficulty of changing from a traditional classroom environment to a distance learning context" (Spitzer, 1998, p. 53).

Garrison and Anderson (2003) have developed a promising new distance education model known as the community of inquiry which involves three main three elements: social presence, cognitive presence and teacher presence. The author has observed that creating a community of inquiry is a challenging task because facilitators fail to implement effective communication practices. One of the study participants revealed how online dialogs can become ineffective when there is a lack of accountability in the teaching and learning process:

> *"If there is only one person talking it is a diatribe or a lecture but not a discussion. Discussions should be mandatory on all counts but at a graduate level if a student continuously is a non-contributor they should be dropped from the program. By the way, this applies to the non-participatory facilitator. This is not deism where it is creator and then there is no more interaction – setting it in motion is not sufficient."*

Study participants were ambivalent about the value of learning teams which are common feature in many online degree programs.

> *"Since this programs practices the use of Learning Teams, one impact is the negative effect on team deliverables, lessens the individual support structure."*
>
> *"For the most part I love the online world. Learning teams have been good and bad. When they are good they are very very good when they are bad they are horrid.*
>
> *My last two teams were aces and we really were a great team playing to strengths and looking out for each other."*
>
> *"Lessen the experience because I do not benefit from their experiences."*

Academically weaker students who lack the motivation to do class assignments will let their colleagues do all their group work. This creates negative experiences for hard working students who will compensate for lazy students by completing the assignments. The author addresses these

situations by using team charters and end of course team evaluations to document student performance and give lower grades to those who fail to make significant contributions to their group work.

The survey highlighted the important role instructor's play in establishing and maintaining a favorable learning climate. Students want instructors who provide timely and fair evaluations of their work while keeping a social and intellectually stimulating presence in their classes. Instructors are expected to share professional insights and demonstrate creativity in stimulating dialog (e.g. Dilbert cartoons).

> *"Facilitators should be personable, supportive and add value. Questions should be answered – personal experiences given – at least once a day. I have had facilitators who showed up to post the dqs [discussion questions] and then feedbacks – never saw or heard from them any other time. So, my needs are simple. I do not want to be their best friend but if I cannot learn something from them why am I taking the class?"*

It is interesting to observe teachers who claim to be student-centered in their educational philosophy but actually are quite controlling in their classes. Teachers can dominate online dialogs by posting an excessive number of messages that highlights the instructor's knowledge expertise but undermines the communication process. Instructors can become threatened by the online setting which has an open ended quality which causes some individuals to strive for security through greater control. Sadly, students are receiving a less academically rigorous education because they are not challenged to be independent thinkers. Students wonder about the quality of their ideas because the teacher fails to create a legitimate dialog that affirms the worth of their questions and concerns. A study participant expressed frustration about an instructor who was excessively absent from their online class:

> *"In my doctoral program none – they were so aloof that we all began to feel like we were floating on an iceberg by ourselves. In one class, I taught the material because the paid facilitator was never there and it was material I had experience with and so I did the facilitation with not a word from the instructor except to stay in track."*

Potential New Directions in Distance Education

A major challenge for today's online instructors involves creating a consistent level of interaction that fosters genuine learning and cultivates a community atmosphere. This will require developing strategies that provide guidance and instruction for individuals and student groups. The study participants were united in their desire to have relevant, personal and intellectually stimulating learning opportunities. Stephen Downes (2006) takes a creative perspective on the issue of interactivity by looking at how online communities are created in classes. "The community owes its existence to the course, and ends when the course does. But the relation ought to be the other way around: that the course content (if any) ought to be subservient to the discussion, that the community is the primary unit of learning, and that the instruction and the learning resources are secondary, arising out of, and only because of, the community" (p. 22).

The distance education movement is entering an important phase of development as competition for students continues to increase as more institutions add courses and degree programs. Educators and administrators will be faced with making choices about the direction of their degree programs. A potential temptation is to become more like traditional universities but this could hinder efforts to seek new and innovative ways to enrich the online environment. One study participant mentioned the need to integrate multimedia into their courses *"instructional designers need to convert many narratives, which are easy to build, to visuals that can be used in the class dialogue for the instructor to explain concepts and the student to interact with and together."*

The author has devoted the past nine years to studying interactivity (communication, participation and feedback) in online classes. Examining research studies on student interaction with course content is often complicated by a multitude of variables. Thurmond (2003) highlights five factors that can influence student perspectives on their ability to learn course curriculum:

- continuous contact with the content – enables students to gain mastery
- clarity of course design – the structuring of the materials and the manner in which it is sequenced will help make it both accessible and easy to understand
- time – adequate time is needed for students to engage with the materials and discourse and to reflect on their learning
- participation in online discussions – this enables students to learn by constructing meaning and knowledge through dialogue and from other perspectives
- mode of delivering course content – appropriate sequencing of content and learning activities will enhance interactivity and make learning more effective and meaningful.

The five factors reveal the complexity within the concept of interactivity and how it plays a pivotal role in determining the quality of the student's experiences. This discussion highlights the nature of the learning problems were not technological but involved human interaction issues and the instructor's communication strategies (e.g. sharing expertise in dialogs).

Research studies have identified three basic student characteristics that are often found in successful online learners: internal locus of control, self-motivation and independence. (Vrasidas and Glass, 2002). Doctoral students are highly motivated but they continue to need guidance Study participants did acknowledge positive benefits to learning teams such as becoming skilled in working together on projects and helping one another. Yet, they expressed concerns about how learning teams contributed to individual intellectual growth and development. Writing a dissertation is not a team project and students who are overly dependent upon their colleagues could have major problems when conducting research. The author mentors online doctoral students and they will comment that dissertation work seems very lonely after working with learning teams for two years.

The research literature supports the need for having a more flexible and informal educational model. Contemporary educators are constantly advocating for more individualized instruction but it continues to be an elusive goal. Perhaps, the problem has been looking at formal teaching and learning models which are too rigid for today's students. The author is just becoming acquainted with informal learning literature that has the potential to engage learners in more meaningful experiences. Personal Learning Environment (PLE) is an example of one of these informal learning theories. Emphasis is place on using technology as a tool to meet educational needs by effectively connecting individuals and resources across a variety of academic disciplines. PLE has the potential to personalize the interaction between people and instructional resources because it is a student driven model with a problem solving orientation (Attwell, 2006; Downes, 2006).

Students vary in their cognitive maturity and educators must develop a set of flexible instructional strategies that will help them to meet a diversity of student needs. Teachers should foster a rich intellectual environment built upon an assortment of multimedia resources (e.g. simulations). A less formal class structure can encourage independent learning activities built around student interests while promoting creativity, reflective thinking, and self-directed learning. It is important that teachers enable students to have the freedom to ask questions and take intellectual risks in their assignments and class discussions. Teachers should facilitate lively discussions by creating

meaningful discussion questions that encourage critical thinking and stimulate student contributions.

Conclusion

This brief discussion offers some unique perspectives into the interactivity challenges during the early stages of online doctoral degree programs. Students expressed being frustrated with instructors who failed to share their expertise with them, were inconsistent in their online presence and fostered superficial dialogs. Educators should devote more attention to developing learning opportunities that are more responsive to student needs and promote genuine interaction with others. Research studies indicate interactivity is closely connected to individuals enjoying their online classes, being effective learners and increases the possibility of them taking another online course (Berge & Muilenburg, 2005).

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APPENDIX A

Interactivity Survey

The purpose of this survey is to investigate interactivity during online graduate courses. The term interactivity (communication, participation and feedback) refers to learners relating to other learners and learners communicating with their instructor. All comments will be kept completely anonymous.

1. What online doctoral degree are you pursuing?

2. How many online graduate courses have you taken?

3. How many online university courses have you taught as an instructor?

4. What do you consider the major advantages and disadvantages to online graduate education?

5. In what ways do classmates who do not keep up with weekly online discussions influence the quality of your learning experiences?

6. If you have participated in online learning team activities, how effective and enjoyable have these activities been for you?

7. What are your expectations for interacting with your instructor during your online class?

8. What makes for quality interactivity in your online classes?

9. In what ways have instructors offered help for your online assignments and projects?

10. What type of online course activities encourages your participation?

11. What has been your experience with the intellectual quality of online discussions?

12. In what ways have online classes discussions promoted growth in your professional knowledge?

13. In what ways can instructors improve the quality of interactivity in online courses?

14. In what ways could instructional designers enhance the quality of online educational experiences?

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Editor's Note: It may seem obvious that success in learning from a text-based medium is dependent on reading skill, but this article reminds us that comprehension is based on the level of language and vocabulary used and the relevance of visual, verbal and auditory examples. Now read on …..

E-Learning Success: Readability versus Reading Skill

Denis M. Finnegan

Abstract

E-learning is growing at 8% annual rate which is a $5 billion investment and the benefits are unclear (Britt, 2004; Jones, 2004; Wutoh, Boren, & Balas, 2004). The importance of E-learning warrants a review of its effectiveness. Numerous studies comparing E-learning to classroom have confounded results (Iverson, Colky, & Cyboran, 2005; Jones, 2004; Stewart & Kraiger, 2005). E-learning and classroom use different sensory inputs, which may account for the confounded results. Classroom instruction predominantly uses verbal discussion while E-learning uses reading. Expecting similar learning outcomes from listening comprehension and reading comprehension may be conceptually flawed. This paper will review adult reading trends, discuss reading level and readability as it applies to E-learning, and suggest further research.

Keywords: e-learning, reading, online learning, adult, readability, reading level, literacy, elearning, asynchronous learning.

Introduction

Can Johnny read online? Can Johnny learn online? The answer to these two questions may suggest ways to improve the success of E-learning programs; in both the academic setting and in corporate training programs. E-learning's popularity in corporate training, college programs, and commercial training courses is growing dramatically. For purposes of this discussion, E-learning includes text-based courses like asynchronous self-directed courses, asynchronous discussion courses, and correspondence courses that use the Internet as the means of correspondence. In these examples, E-learning requires the student to read course material, post written responses, and interact with fellow students though threaded online text-based discussions. E-learning's text based approach is notably different from traditional classroom courses. Hiltz (1994) as cited in Wiesenberg (1999) states,

> *"The most frequently cited distinctions between the traditional face-to-face and new virtual classroom are structural; speaking and listening in the traditional classroom versus typing and reading in the virtual classroom; everyone moving at the same speed versus self-paced; a set time and place versus anytime and anyplace; social interaction as inappropriate versus social interaction as appropriate at the discretion of the participants; recording responsibility being the students' versus the system's; and utilization of advanced technologies in learning a luxury versus a necessity." (Wiesenberg, 1999, para. 5).*

E-learning is gaining in popularity and warrants continued study of its effectiveness, "During the 1999-2000 school year, for example, an estimated 1.5 million students, or about 1 of every13 postsecondary students, took at least one telecommunications distance education course" (Ashby, 2004). It is critical that educators understand the unique challenges of E-learning in order to design effective instruction. Distance education courses have many variables in design, like the use of graphics, audio, and video. One common element of E-learning is that the primary instructional method which is reading text. This paper intends will begin the exploration of the hypothesis that course readability and student reading level impact online learning success.

The Investment and the Results

The goal of E-Learning should be learning or knowledge gain that positively affects performance or behavior. E-learning, as a learning methodology, is increasing in use and investment throughout the education spectrum (Tanquist, 2001). E-learning effectiveness, as measured by learning and student preference, has mixed results (Anderson, 2005; Cappel & Hayen, 2004; Esch, 2003; Gallaher, 2002; Greengard, 1999; Hodson, Connolly, & Saunders, 2001; Schulman & Sims, 1999). The investment in E-learning is expected to exceed $4.7 billion in 2007 and the benefit of those investments are in question (Britt, 2004). E-learning and classroom are often compared determine which is more effective (Chapman, 2005; Hylton, 2006; McFarland & Hamilton, 2005; Schulman & Sims, 1999). These studies have confounded results and report marginal differences between methodologies.

Comparison studies often focus on measuring the effectiveness of each methodology on factors like student preference, knowledge gain, and barriers (Anderson, 2005; Browne, Mehra, Rattan, & Thomas, 2004; Esch, 2003; Gallaher, 2002; Mungania, 2004; Stewart & Kraiger, 2005). Comparing two methodologies like classroom and E-learning may be faulty in conceptual design due to the differences in sensory input for students. In the typical classroom, students interact with the content most often though verbal interchange, dialogue, using speech and hearing (Wiesenberg, 1999). In E-learning, students interact with the content primarily through seeing and reading. The comparison when testing classroom versus E-learning, is of listening skill versus reading skill (McFarland & Hamilton, 2005).

One common attribute of E-learning programs is they are predominantly text based. Success in text-based courses is dependent on reading skills. E-learners have varied reading skill levels and preferences with online reading (Vernon, 2006). E-learning courses also vary greatly in readability or reading level (Allen & Dutt-Doner, 2005). The gap between student reading skill and course readability will affect student comprehension and learning. Reading skill must equal or exceed readability to ensure comprehension and learning. Readability is the match of reading skill and reading level. It is the responsibility of course designers, teachers and program administrators to ensure that courses are constructed and delivered at an appropriate level for the target audience.

Education programs intend to cause learning and help students clear up misunderstandings. In classroom instruction, the teacher addresses confusion or misunderstanding through the use of questions and dialog. Teachers have the responsibility to monitor and assist each learner achieve the learning goals. One of values teachers bring to the learning environment is the ability to design and deliver training that causes reflection, processing, and thinking (Dewey, 1997; Merriam, 2004; Wiesenberg, 1999). The challenge of the E-learning classroom may be the distance between the student and the instructor (Wiesenberg, 1999). In a traditional classroom the instructor will detect the puzzled look and engage the learner in dialog. In the virtual classroom this is more difficult due to lake of timely student feedback. Another difficulty in addressing classroom confusion is diagnosing the root cause. Is the student confused by the concept or was he or she unable to comprehend the presented written material? These problems may have very different remedial solutions. Confusion may be resolved through an alternative explanation or approach, while poor reading comprehension skills may require the course material to be written or explained at a different grade level. In the case of E-learning the key to success is the readability of material and how well that matches the students reading skill.

Adult Reading Skills

Literacy is critical to individual and societal success. Literacy is defined as “the quality or state of being literate, esp. the ability to read and write” (*Random House Webster's College Dictionary* 1999, p. 782). Key to being literate is being able to use information or to be Information Literate

(IL). "IL is inextricably associated with information practices and critical thinking …" (Bruce, 2002, p. 1). IL is the ability to locate, digest and solve problems in our everyday lives. In a democratic society, citizens need IL skills to make purchases, choose political candidates, make health decisions, and so on.

Adult reading skills are critical to workplace success and to be information literate (NIFL, 1996). Organizations show increased productivity by improving reading skills by as much as 10% (NIFL, 1996). Workplace reading research is rare and most adult reading research is for Adult Basic Education (ABE), English as a Second Language (ESL) and for other challenged populations. There have been declines in reading habits in America, for example; newspaper reading has declined (NIFL, 1996; Scales & Rhee, 2001). Adult literacy research shows a decline of reading skill and frequency (McFarland & Hamilton, 2005; NIFL, 1996).

Recent statistics on adult literacy are discouraging, "U.S. adults scored below four out of five other countries in literacy and numeracy" (Livingston, 2006, p. 2). Reading habits and reading trends may be contributing to the decline in literacy,

> *"On a daily basis, 48 percent of adults reported reading newspapers or magazines, 32 percent reported reading books, and 51 percent reported reading letters and notes (see supplemental table 20-1).In comparison, the percentages of adults who reported reading less than once a week or never was 15 percent for newspapers or magazines, 38 percent for books, and 20 percent for letters and notes. Eighty-eight percent of adults reported having 25 or more books in their home." (Rooney et al., 2006, p. 52).*

Reading is a critical component of literacy and American adults are challenged,

The research on adult reading skill varies but clearly demonstrates the challenge adults have and this has significant implication for E-learning

> *"According to the National Adult Literacy Survey, 42 million adult Americans can't read; 50 million can recognize so few printed words they are limited to a 4th or 5th grade reading level; one out of every four teenagers drops out of high school, and of those who graduate, one out of every four has the equivalent or less of an eighth grade education." (Sweet, 1996, para. 4).*

Reading rate is declining, "The higher the education level, the higher the reading rate, but reading among every group has declined over the past 20 years" (Bradshaw & Nichols, 2004, p. xi). On the positive side, there has been an increase in percentage of high school graduates who enter and complete a bachelor degree program and that is positively associated with reading habits, "Adult reading habits are positively associated with educational attainment: the more education a person attained, the more likely that person was to report reading newspapers or magazines, books, or letters and notes daily in 2003" (Rooney et al., 2006, p. 51).

The research cited in this paper clearly demonstrates the decline in reading abilities across America. The decline in reading skills probably negatively impacts reading comprehension. Reading comprehension therefore, must affect E-learning success, since E-learning is dependent on reading. McDonald, Dom, and Dom (2004) as cited in McFarland and Hamilton (2005), "…online students must be proficient readers in order to be successful. Yet, in the authors' combined 25 years of university teaching experience, we have noted that more and more students seem to avoid reading as much as possible" (McFarland & Hamilton, 2005, p. 26). One factor that may be contributing to this decline in reading may be the readability of the course material. As the gap between student skill and the difficulty of the material widens, it is understandable that readers will change their reading habits. This may become a downward spiral, as reading frequency declines, skill declines, and so on. This downward spiral may have an every increasing rate of decline due to the readability challenge of many E-learning courses.

Readability

The introduction of the internet, email, text messaging, and other forms of written communication is impacting the nature of reading. Reading is shifting from text like passages that include articles and books to one-liners, bulleted outlines, phrases, and a new language like non-standard instant messenger abbreviations, i.e., "LOL" Laugh Out Loud." In addition, the overload of written communication like email, Instant Messages, internet, and intranet articles requires different reading skills. Many people scan the material and look for the key item. When one receives dozens of emails a day reading for deep comprehension probably can not occur.

The impact of readability is critical to successful reading and comprehension. Readability is the "…characteristics of the text itself, rather than to the design superstructure that surrounds the text. By readability, we mean a focus on text that most uses will be able to read once and understand…" (Hackos & Stevens, 1997, p. 285). Readability is a critical aspect of ensuring students can understand course content. In a learning application, text based instruction needs to be clear, easy to read, focused on the learning objective and free from extraneous material. However, readability is also reader centric. Reading skill levels vary greatly in the adult population (Rooney et al., 2006). It is critically important that authors, teachers and those presenting information write the material so that it is readable by the target audience (Abram & Dowling, 1979; Aldridge, 2004; Denethia, Melva, Deborah, Sara, & et al., 2003; Wegner & Girasek, 2003).

Writing for the target audience is important to comprehension. Writers, authors and E-learning developers need to know their natural writing level and ensure they write to the level of the audience (Larocque, 2006). If one writes at a natural level of 12th grade but the audience reads at the 10th grade it behooves the author to wrote at or near the 10th grade to ensure comprehension. Larocque (2006), states that many writers worry they may "dumb down" their material but suggests writing for comprehension is the goal of quality writing (p. 41). The effectiveness of E-learning will increase as readability is improved. E-learning designers, teachers, and program administrators should consider the readability of a course of interests and the subject learners reading level. If the goal of educational course is learning why would designers write a course that the student cannot comprehend? It is critically important that instructional designers analyze the needs of their students (Visscher-Voerman & Gustafson, 2004).

E-learning

E-learning's popularity in America is growing (Britt, 2004; Karr, 2002). The effectiveness of instructional design of many E-learning courses is in question (Bray & Barron, 2003; Keller, 2005; Schoenfeld & Berge, 2004; Smith, 1986). Internal teams with varied backgrounds in instructional design and development are increasingly developing E-learning courses. With the introduction of easy to use tools like Macromedia Flash, Captivate, Breeze, Vuepoint Learning System, and so on; many subject matter experts are developing courses with little of no background in instructional design. Even those trained in instructional design seldom evaluating readability or reading level of their audiences. Reviews of commercially available Instructional Systems Design (ISD) courses show no reference to readability.

Instructional designers of E-learning must consider the impact of reading online. Online reading is different from book reading. Consider the differences that occur in variable methods that print-based text is presented, from paper quality, font size, margin differences, and so on. Now consider putting that information on line and the reader has additional challenges,

> *"Writing for the Web differs from writing for print media –our eyes have adapted to paper as the medium and are trained to scan paragraphs, turn pages, etc. On a screen,*

> *sentences can fill the width of the monitor, and are often too wide. Small type is difficult to read because of the resolution and flicker of the display. Moreover, because of the proliferation of information on the Internet, users can quickly become overwhelmed. As a result, information has become devalued and people have developed ways to subconsciously filter out non-vital information, and be more discriminating about what they will take the time to read." ("ONLINE: Effective writing for the Web," 2003).*

E-learning requires students to read, comprehend, and reflect to enable learning (Hmelo-Silver, 2004; McGlinn & Palmer, 2005; Merriam, 2004). It is critical to narrow the gap between course readability and learner reading skill. This narrower gap will increase the probability that comprehension and learning will occur.

Assessing Reading Level and Readability

Matching the course or instructional material readability to the target student populations reading skill will enable comprehension. Popular newspapers show a decline in subscriptions and at least one author suggest it is related to readability,

> *"Today's journalists, already the most educated crop of reporters and editors ever, need more ongoing education so they can interview with sophistication, research with understanding and report with credibility, but when it's time to write Meyer suggests they shed the sheepskins and scribble their stories at a sixth- to eighth-grade level, a range he identifies as the sweet spot of newspaper readability." (Meyer, 2005, para. 3).*

Meyer (2005) suggests writing for the reading level of the audience for a newspaper and one can easily see the relevance for authors of instructional material.

Measuring reading level can be accomplished using numerous tools like Gunning-Fog, Flesch Reading Ease, and the Flesch-Kincaid Grade level instruments (Larocque, 2006; Wise, 2003). The intent of reading assessments is to measure comprehension or functional literacy. Literacy is the ability of individuals to function within their society (Fueyo, 1988; Gupta, 2006; Sticht, 2006). Literacy is measured various ways, including prose, document, and quantitative (*National Assessment of Adult Literacy* 2003). Comprehension allows the reader to use the information. Comprehension is a key attribute of literacy. One aspect of functional literacy is prose literacy, "The knowledge and skills needed to perform prose tasks, (i.e., to search, comprehend, and use continuous texts). Examples include editorials, news stories, brochures, and instructional materials" (*National Assessment of Adult Literacy* 2003). It is critical that reading level of educational material be appropriate to the target audience.

Reading level is a measure of reading ability of an individual reader. Reading level is often reported by grade level. Grade level is roughly equivalent to school grades, for example, grade level 10 suggest the material or the reader skill is at the Sophomore in high school level of complexity. However, the grade level one completes does not automatically guarantee that is the one's reading grade level. Reading is a critical skill for functional literacy. From buying groceries to reading instructions on medical prescriptions, it is critical to match the reading skill with the reading level of the information (Lave, 1988). Most patient medical information is written at the high school or college level, many researches suggest writing this material at the fifth or sixth grade level (Aldridge, 2004; Wallace, Turner, Ballard, Keenum, & Weiss, 2005). The RAND Reading Study Group (2002), as cited in Coiro (2003) reports, "… recognized features of conventional texts, such as varying genres, structures, reading levels, and subject matter that create potential challenges for readers" (Coiro, 2003, p. 459).

The criticality of reading and literacy is highlighted in the 2003 survey by the National Assessment of Adult Literacy, which found the adult population prose literacy distribution to be

14% below basic, 29% basic, 44% intermediate and 13% proficient. “Prose Literacy levels are defined as “Below Basic: no more than the most *simple* and *concrete* literacy skills; Basic: can perform simple and everyday literacy activities; Intermediate: can perform moderately challenging literacy activities Proficient: can perform complex and challenging literacy activities” (*National Assessment of Adult Literacy* 2003). Given that, 43% of the adult population is at the basic or below basic level of prose literacy, it is critical to ensure that instructional material is prepared at a level that will enable this population to learn.

Readability is the connection between understanding and comprehension as compared to the writing style of the author (Abram & Dowling, 1979). Abram and Dowling (1979) suggest that one instrument to measure readability for adults is the Flesch-Kincaid Reading Ease formula. As an example, this paper scores a 25.8 on Flesch reading ease and a 12.6 on Flesch-Kincaid grade level using Microsoft Word Readability Statistics function. Abraham and Dowling discuss that the Flesch-Kincaid instrument determines readability by evaluating the number of syllables and words per sentence in a 100-word sample (p. 366). Klare and Campbell (1967) as cited in Abraham and Dowling (1979) suggest that a score of 25.8 is “very difficult” and “college graduate level” (p. 366). As an example, if this paper was intended for the general population, half or more of the population would find it difficult to read. Putting this paper online may increase its difficulty further for some readers (Vernon, 2006).

Online Reading

Online reading is relatively new and its application to learning even newer. Personal preference will affect outcomes and one would assume comprehension, “an important area of research considers student learning styles and its affect on student performance in an online class” (Wiesenberg, 1999, p. 30). One study of graduate students found clear preference for traditional reading mediums, “Fifteen (18.3%) of the statements were positive toward the electronic text. Nine (11.0%) statements were ambivalent or neutral. Fifty-eight (70.7%) were negative. These students clearly preferred a paper text or offered a rationale for why they were using a printed copy” (Vernon, 2006, pp. 422-423). Similarly many studies that compare classroom to E-learning find preference for classroom (Jones, 2004). An issue that warrants further investigation is the source of the preference. Preference may be based on habit and experience or it may be related to ones learning style (Kolb, 1984; McFarland & Hamilton, 2005). Preference or learning style is an important factor that instructional designer must consider (Blass & Davis, 2003; Cassarino, 2003; Lewis & Orton, 2000). McFarland and Hamilton (2005) attempted to further the answer to fundamental questions on learning differences in online versus traditional classroom posing "Are these factors different for online and traditional classes?" (McFarland & Hamilton, 2005, p. 25).

One aspect of McFarland’s and Hamilton’s (2005) research that was not specifically addressed was reading skill impact on learning. They found no significant difference in course satisfaction and grade between the online and classroom students. It is the hypothesis of this author that there may have been a difference if reading skill and readability of the online material were included in the research. McFarland and Hamilton (2005) did suggest that online content is difficult and needs to be addressed, “The first context is to make the materials less difficult to learn from, that is, elaborate upon them and made them clearer” (p. 35).

Future Research

The effect that readability and reading skill have in E-learning raises many questions. How does one measure the reading level of online text when there are hypertext links, graphics, and other attributes of the reading? How does reading online differ from traditional book reading? Are there generational or age differences in online reading ability due to experience with internet-based

reading? What is the effect of the physical difference in reading on a CRT or LCD panel versus a book? There are many other questions and the current focus of this author's research is the impact online reading has on adult E-learning. The intent is to compare a representative sample of employees, from a Fortune 100 company, reading ability to a representative sample of that company's E-learning course readability. The hypothesis is that online reading skill is significantly different (lower) then the readability level found in most E-learning courses.

Conclusion

Learning online requires reading comprehension skills sufficient to master the material presented. There is a need for ongoing research to evaluate the online reading skills of typical adult learners as compared to the readability of E-learning courses. The implication of the research will influence instructional design techniques, particular the level of language / vocabulary used, use of graphics, page layout, interactions, and other methodologies to engage the learner in a deeper level of engagement with the content. Designing E-learning with an appropriate reading level will enable "Johnny" to read and comprehend the material which will foster "Johnny's" learning. Researches, E-learning designers and instructors must stay focused on the goal of E-learning, "Learning" (Finnegan, 2005).

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