

Running head: EFFECTIVE USE OF RICH MEDIA IN ID

Understanding Effective Use of Rich Media in Instructional Design

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Abstract

The general purpose of this study is to determine the effectiveness of video instruction as opposed to the traditional lecture. Within a group of 21 first-grade participants, an online gingerbread activity will be administered to support the findings. The students will be separated into two groups, and each student will be asked to recall simple steps to create the gingerbread man. It is hypothesized that the results will show that the students who receive the video instruction will be able to recall more information than those who receive the traditional lecture instruction of just the audio portion of the instructional video. If the results turn out as expected, this study will suggest that due to the effectiveness of video instruction it should be used as a method to enhance student learning.

Understanding Effective Use of Rich Media in Instructional Design

With the advent of computers, the traditional style of learning in the 20th century, and subsequently the 21st century, has been transformed; insofar as, the use of visual-rich media has played a more important role in teaching. While the beginning of the 20th century saw the use of slide shows and film as epitomizing this transition, the use of computers, with a solid emphasis on student-content interaction, has propelled education into an even more visually rich environment. This in conjunction with more teachers leaning towards a constructivist teaching pedagogy, in which the students construct meaning for themselves, has led to a re-visioning of where education needs to head. The first section of this literature review will examine modern constructivist notions of learning and how these pedagogical stances are being infused in the learning environment. This approach to learning is subject-centered in nature but complementary to the educational triad, that between teacher-student-content, on a whole. The constructivist approach to learning is directly beneficial to students when appropriate mediums such as screen recordings and videos-on-demand are utilized and is explored in the second section of this review.

Constructivism in Visually Rich Media

While screen recordings and videos-on-demand are not constructivist in nature by themselves, when utilized in combination with a constructivist pedagogical approach, they provide instruments to enable a strong subject-student interaction--thus allowing students to form their own construction of knowledge. Constructivist-centered pedagogy is "becoming more prevalent in teacher education programs and public schools across the nation, while demonstrating significant success in promoting student learning" (Gordon, 2009, p. 40). As Piaget's research pointed out, "knowledge [is] a process of inquiry and reasoning" (Gordon,

2009, p. 51). As teachers, we are not dealing with empty vessels waiting to fill but rather humans who bring their own perspectives and experience to the table. Consequently, the notion that "teaching is a political act" (Kroll, 2004, p. 216) is a central tenet to many constructivist activists. When we allow our students to feel a part of the learning process, they play a more central role in the forming of knowledge itself. Paulo Freire, a Brazilian educator, furthers this notion of teaching being a political act as he asserts that traditional pedagogies placing the teacher as feeder of knowledge to the students becomes a form of ideological oppression in which the students become servants to the educational society at large (Spring, 2008). Freire extrapolates that this "banking education, [in which] the teacher is the primary actor whereas the students are the recipients" will result in students feeling as if they are objects and thus "be treated as if one were without life" (Spring, 2008, p. 208).

While many constructivist advocates might not concern themselves as much with the oppressive nature of traditional educational pedagogies of the early 20th century as Freire does, most would agree that "students need to be exposed to the variety of ways [constructivist theories are] framed" (Kroll, 2004, p. 200). However, as Osborne(1996) points out, "a more serious criticism of the constructivist theory is that it provides no well-defined mechanism by which the individual can develop new constructs with which to see the world" (p. 76). Gordon (2009), citing Baines and Stanley (2000), exemplifies this notion of not having a solid foundation in which to practice constructivist pedagogy as many teachers often only "set up the learning environment, know student preferences, guide student investigations, and then get out of the way" (p. 40). However, this notion of constructivism being completely student led negates the fundamental theories that are infused into modern constructivist pedagogy; insofar as, Vygotsky's Zone of Proximal Development is an integral part of constructivist practices as

"Vygotsky's original insight is that what children can do with the assistance of others not only needs to be taken into account when one considers their performance, but may be even more indicative of their mental development than what they can do on their own" (Gordon, 2009, p. 52). The constructivist mantra is not merely to tell the student to open a book and learn; rather, the teacher must help scaffold concepts to allow the student to construct meaning for themselves. Clark and Graves(2008)epitomize this conceptual understanding stating "inherent in the concept of scaffolding is the gradual release of responsibility model" (p. 10).

Benefits of Visually Rich Media

Reiser and Dempsey (2007) define "rich media as learning products that incorporate high-end media such as video, animation, sound, and simulation" (p. 312). One such commercial product that fulfills this definition is TechSmith's Camtasia Studio--a screen capture program that records mouse movements and screen shots and allows the user to record narration plus incorporate animation to accentuate what has been recorded. This tool, which is often used in commercial training programs, has already been tested in academic areas. In one study, the program was utilized to record student conversations as they were asked to navigate the Internet in an attempt to determine web literacy skills (Kuiper, Volman, & Terwel, 2008).

The movement away from regular lectures to computer-assisted lecture formats has been ongoing and is still being tested for its efficacy. However, the preliminary results have shown that multimedia can have positive effects on students' retention of knowledge. At Liverpool John Moores University, a longitudinal study of six years was conducted to see the effects of multimedia instruction on an undergraduate plant science module. With the integration of multimedia usurping traditional lecture for this particular science module, pass rates for the test went from a low of 52% to a high of 87% at the end of the six year study (Sneddon, Settle, &

Triggs, 2001). The data depicted a sharp increase in pass rate, from 63% to 87%, when the multimedia lecture was introduced (Sneddon et al., 2001). Another study examining student understanding of superconductivity echoed this sentiment as the small group, which did not receive a traditional lecture and discussion format, "demonstrated greater linking of concepts as shown by their post-test responses...likely prompted by the integration of video slices" (Mayo, Sharma, & Muller, 2008, p. 490).

One area for the modern educator producing these rich media presentations to be careful of is the use of "seductive details...[whose] negative effects...[distract] the learner...by disrupting the building of a mental model...or by activating inappropriate prior knowledge" (Reiser & Dempsey, 2007, p. 319). Having arbitrary animation or text in a presentation can actually negatively affect retention. Even when some studies depict no difference between content presented in a multimedia format versus a traditional lecture format, such as Chan's analysis of multimedia in an art appreciation course, often students will report course satisfaction higher in a "multimedia hybrid group than [a] traditional group"(Chan, 2008, p. 146). This sentiment was echoed in Conway's examination of hypermedia in which "students generally reported that the computer-based lecture materials were presented more clearly than materials in standard lectures" (Conway, 1994, p. 146).

Summary

While rich media and the use of computers in education might not be the panacea for academia's woes, it can provide a vehicle for strong student-content interaction. Thus, this cognitive grappling of concepts, provided the teacher helps to facilitate this interaction, can pave the road to help infuse a more constructivist pedagogy desperately needed for a generation of students who learn by doing and constructing meaning themselves. While the use of screen

capturing programs, such as Camtasia Studio, has been shown to be an effective commercial training tool, the research into the use of such programs in education is still in its infancy.

Method

Participants

Students enrolled at Urbita Elementary school in San Bernardino will be asked to participate in this study. The selection of participants will be from Mrs. Dacio's First grade class. It is expected that all students in Mrs. Dacio's class will participate which totals twenty-one students. Of the twenty-one students, twenty are Hispanic and one is Caucasian. Ten of the Hispanic students are English Language Learners (ELL). The gender distribution is nine girls and twelve boys. The age of the participants is between six and seven years-old.

Materials

A Camtasia recorded instructional video will be used to demonstrate to participants how they are to build a gingerbread man using the Flash-based gingerbread man creator on the Starfall.com Web site.

Design and Procedure

The design of this study will be a posttest-only control-group experimental design. The independent variable will be learning modality. The dependent variables will be student accuracy in applying instructions recorded by Mrs. Dacio after her students have completed a post application test, the participant's gender, and whether English is the participant's primary language. No pretest will be given in order to control for practice effect.

Mrs. Dacio will separate the students into four categories: girls whose primary language is English, boys whose primary language is English, girls whose primary language is not English, and boys whose primary language is not English. From the four categories Mrs. Dacio will randomly assign matched pairs into two groups. The experimental group will be shown the

Camtasia created audio/video presentation instructing the participants as to which types of specific features to add to a gingerbread man. The control group will be simultaneously presented the same audio presentation without the video. The presentation and testing will take place in the Urbita Elementary school computer lab with privacy screens in place for each participant's station and the assessment will take place immediately after the instructional presentation to both groups.

The Web site Starfall will be used to assess participant's retention of the information presented in the instructional tool. While on the Starfall Web site, participants will use a Flash-based application to select assignment of three features and three feature color choices for a gingerbread man. The features choices consist of circle, triangle, square, or rectangle for the eyes; sphere, cone, and cube for the nose; and circle, triangle, square or rectangle for the buttons. The feature choices are then followed by color choices for each feature consisting of blue, brown, and green for the eyes; purple, yellow, or pink for the buttons; and red, brown, or orange for the nose. The gingerbread man graphic appears on the left of the screen and each feature choice eyes, nose, and buttons, and each feature color choice appears sequentially on the right of the screen. According to the instructional presentation, once each step is completed, the final gingerbread man should have had green triangle eyes, a red cone nose, and yellow circle buttons.

Mrs. Dacio will coordinate the students as they move throughout the steps by saying "now choose the shape for the eyes, click the green arrow to move to the next step, now choose the nose shape, etc." but will not be instructing the students as to which selection the student needs to make for each feature. Once the assessment is completed, Mrs. Dacio will record the results of each student by counting how many features the student chose that correctly matches what they were instructed to select in the instructional presentation. During the statistical

analysis the data will be examined to determine if a correlation exists between the independent variable and the dependent variables, the assessment score, gender, and English as a primary language.

Results

The data collected from both the experimental and control groups will be the results of how many features of the gingerbread man building process each participant correctly completed after having been administered the instructions explaining the steps to build the online gingerbread man in either an audio only or audio/video presentation. A paired t-test will be used to analyze the resultant data for significance. A comparison of the mean values between the video group and the audio-only group will be compared and evaluated as to which group was able to complete all steps of the gingerbread more consistently. The t-test will show if there is a significant difference between the two groups or not.

Discussion

If the results show that the group of participants presented with the audio/video instruction was able to re-produce the feature specifications according to the instructions more consistently than the audio-only group, this will imply that a dual modality presentation does enhance learning. In addition, if the P value from the t-test is small, then it is unlikely that the treatment effect was due to a coincidence of random sampling. The null hypothesis that the treatment effect did nothing can be rejected and it can be concluded that it is statistically significant. In considering the research presented in the literature review, if the results of this research project yield similar findings then the statistical significance will bear evidence towards the likelihood that video presentations are a more effective means of delivering instructional content and enhancing student learning.

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Sample IRB Form

IRB COVER SHEET (revised 4/27/06)

Date of Submission: 12/10/2009		IND #:	IRB #:
Reason for Submission		IDE #:	IRB USE ONLY: DATE STAMP:
New Project	<input checked="" type="checkbox"/>	HDE#:	
Response to Comments	<input type="checkbox"/>	If there is an IND or IDE number provided, please include 4 copies of the investigational drug or device brochure.	
Reconsideration	<input type="checkbox"/>		
Disapproval Resubmission	<input type="checkbox"/>		
Modification	<input type="checkbox"/>		
Renewal	<input type="checkbox"/>		
Renewal with Modification	<input type="checkbox"/>		
Adverse Event Report	<input type="checkbox"/>		
Response to Audit	<input type="checkbox"/>		
PART A – DEMOGRAPHIC INFORMATION			
Title of Study: Understanding Effective Use of Rich Media in Instructional Design			
Principal Investigator Information:			
Name: Bill Bennett		Title: MSIDT Masters Student	
Address: 15441 Washington St.			
School: Calif. State University, Fullerton		Department: College of Education	Division: Instructional Design & Technology
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Name of Department Chair: Dr. Joann Carter-Wells			
Co-Investigators: Hiedi Dacio			
Coordinator Information (Please list the person that the IRB can contact with questions):			
Name: Carl Reynold			
Address:			
Phone number:		Fax number:	
E-mail address: crenold@fullerton.edu			
PART B – LEVEL OF RISK/TYPE OF REVIEW REQUESTED			
Indicate the level of risk:		<input checked="" type="checkbox"/> Minimal <input type="checkbox"/> Greater than Minimal	
Indicate the type of review requested:		<input checked="" type="checkbox"/> Full Board <input type="checkbox"/> Expedite	

PART C – RECRUITMENT INFORMATION	
Number of participants to be enrolled at this site (Note that the University of Pittsburgh IRB considers a participant to be enrolled if s/he signs an informed consent document. If a higher number of participants must be enrolled for screening in order to hit a targeted accrual number, please indicate the higher number.)	21
Number of participants to be enrolled at multicenter sites. Please provide 4 copies of the multicenter protocol. If this is not a multicenter study, please indicate "N/A."	N/A
Indicate whether this site is the coordinating center for this study.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Indicate whether this site is the data coordinating center for this study.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Indicate the gender of all participants in this research study.	<input checked="" type="checkbox"/> Male <input type="checkbox"/> Female
Indicate the age range of all participants in this research study.	6 – 7 years-old
Indicate the duration of study participation per participant.	15 minutes
Indicate the duration of the entire study.	15 minutes

PART D – SOURCE OF SUPPORT	
Indicate all applicable sources of support and provide additional information as noted:	
<input type="checkbox"/> Federal	Name of Sponsor:
	Awardee Institution:
	Grant Number:
	Grant Title:
For a federally funded study, please provide two (2) copies of the entire grant application with salary information redacted.	
<input type="checkbox"/> Commercial	Name of Sponsor:
For a commercially funded study, please provide either a check, a payment form from the IRB website or a request for waiver of the fee.	
<input type="checkbox"/> Foundation	Name of Sponsor:
<input type="checkbox"/> Other	Name of Sponsor:
<input type="checkbox"/> No support	

PART E: CONFLICT OF INTEREST

If the response to any of these questions is "yes," please attach detailed information including who has the conflict to permit the IRB to determine if such involvement should be disclosed to potential research subjects.

Does the principal investigator or any co-investigator or research coordinator involved in this study (or in aggregate with his/her spouse, dependents or members of his/her household):		
a. possess an equity interest in the entity that either sponsors this research or owns the technology being evaluated that exceeds 5% ownership interest or a current value of \$10,000?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
b. receive salary, royalty, or other payments from the entity that either sponsors this research or owns the technology being evaluated that is expected to exceed \$10,000 per year?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
c. have an agreement with the University or an external entity that would entitle sharing current or future commercial proceeds related to the technology being evaluated (e.g., royalties through a license agreement)?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
d. have a financial relationship with a start-up company (which is being monitored by the Entrepreneurial Oversight Committee) that has an option or license to utilize the technology being evaluated?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

PART F: RESEARCH PROCEDURE BILLING

If the response to both questions below is "yes," research fiscal and compliance review is required. If the participant does not visit any of the facilities listed or if the study involves only interviews or questionnaires, research fiscal review is not required. The IRB and/or institutions listed also have the authority to request a research fiscal review based on their review of the research submission.

Will testing, services, or procedures be performed, samples obtained, or hands-on care be provided regardless of whether it is being paid for by the study or billed as conventional care?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Will these be done at a UPMC facility (including Children's Hospital of Pittsburgh or Magee-Womens Hospital)?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

PART G: ADDITIONAL APPROVALS REQUIRED		
Has this protocol been reviewed by a local scientific review committee? (Note: studies that are federally or commercially sponsored do not require a local scientific review to be conducted. However, there are specific departments that do require local review. Please check with your department if you are unsure.)	<input type="checkbox"/> Yes Please attach approval letter	<input checked="" type="checkbox"/> No Indicate the reason:
Does this research involve the administration, for research purposes, of a drug (investigational or FDA approved)?	<input type="checkbox"/> Yes Attach IDS notification	<input checked="" type="checkbox"/> No
Does this protocol involve the exposure of human subjects to ionizing radiation (excluding the standard diagnosis or treatment procedures, performed in a routine clinical manner and frequency)? (Note: If you are unsure of whether the study requires submission to the RDRC, please consult Appendix D of the IRB Reference Manual.)	<input type="checkbox"/> Yes Attach RDRC/HUSC approval letter	<input checked="" type="checkbox"/> No
Does this research study involve the deliberate transfer of recombinant DNA (rDNA) or DNA or RNA derived from rDNA into human subjects?	<input type="checkbox"/> Yes Attach IBC-rDNA approval letter	<input checked="" type="checkbox"/> No

CERTIFICATION OF INVESTIGATOR RESPONSIBILITIES

By signing below I agree/certify that:

1. I have reviewed this protocol submission in its entirety and that I am fully cognizant of, and in agreement with, all submitted statements.
2. I have adequate resources and facilities to carry out the proposed research.
3. I will conduct this research study in strict accordance with all submitted statements except where a change may be necessary to eliminate an apparent immediate hazard to a given research subject.
 - I will notify the IRB promptly of any change in the research procedures necessitated in the interest of the safety of a given research subject.
 - I will request and obtain IRB approval of any proposed modification to the research protocol or informed consent document(s) prior to implementing such modifications.
4. I will ensure that all co-investigators, and other personnel assisting in the conduct of this research study have been provided a copy of the entire current version of the research protocol and are fully informed of the current (a) study procedures (including procedure modifications); (b) informed consent requirements and process; (c) potential risks associated with the study participation and the steps to be taken to prevent or minimize these potential risks; (d) adverse event reporting requirements; (e) data and record-keeping requirements; and (f) the current IRB approval status of the research study.
5. I will not enroll any individual into this research study: (a) until such time that the conduct of the study has been approved in writing by the IRB; (b) during any period wherein IRB renewal approval of this research study has lapsed; (c) during any period wherein IRB approval of the research study or research study enrollment has been suspended, or wherein the sponsor has suspended research study enrollment; or (d) following

termination of IRB approval of the research study or following sponsor/principal investigator termination of research study enrollment.

6. I will respond promptly to all requests for information or materials solicited by the IRB or IRB Office.
7. I will submit the research study in a timely manner for IRB renewal approval.
8. I will not enroll any individual into this research study until such time that I obtain his/her written informed consent, or, if applicable, the written informed consent of his/her authorized representative (i.e., unless the IRB has granted a waiver of the requirement to obtain written informed consent).
 - I will employ and oversee an informed consent process that ensures that potential research subjects understand fully the purpose of the research study, the nature of the research procedures they are being asked to undergo, the potential risks of these research procedures, and their rights as a research study volunteer.
9. I will ensure that research subjects are kept fully informed of any new information that may affect their willingness to continue to participate in the research study.
10. I will maintain adequate, current, and accurate records of research data, outcomes, and adverse events to permit an ongoing assessment of the risks/benefit ratio of research study participation.
11. I am cognizant of, and will comply with, current federal regulations and IRB requirements governing human subject research including adverse event reporting requirements.
12. I will make a reasonable effort to ensure that subjects who have suffered an adverse event associated with research participation receive adequate care to correct or alleviate the consequences of the adverse event to the extent possible.
13. I will ensure that the conduct of this research study adheres to Good Clinical Practice guidelines.
14. I will ensure that all listed investigators have the appropriate credentials to conduct the portion of the study in which they are involved.

Bill Bennett



12/10/2009

Principal Investigator's Name

Principal Investigator's Signature

Date