



Cross-Curricular Digital Storytelling Assignments to Measure Motivation

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To cite this article:

Shahrzad Vafa, Janelle Bouknight. Cross-Curricular Digital Storytelling Assignments to Measure Motivation. *American Journal of Education and Information Technology*. Vol. 4, No. 2, 2020, pp. 66-72. doi: 10.11648/j.ajeit.20200402.14

Received: July 1, 2020; **Accepted:** July 20, 2020; **Published:** August 10, 2020

Abstract: There are different approaches in integrating technology in teacher education programs. Choosing effective technology assignments and projects are an important design element in pre-service technology courses. This paper will share the experience of implementing and examining a cross-curricular assignment digital story that was assigned in two separate courses, an educational technology course and an introduction to literacy course, over a two-year period. Students enrolled in the first-year teacher education program were the participants of this study. There was a lack of significant research regarding cross-curricular assignments at the collegiate level. This research examining motivation and cross-curricular tasks can help mitigate this dearth of research on the topic. The purpose of this study is to learn if students will be more motivated to complete the cross-curricular assignment, which was the creation of a digital story, compared to the stand-alone assignments. We expect our students to see value in combining the skills from both classes to create a meaningful project with real-world use. This study implemented survey research using quantitative data to acquire better insight and understanding of how motivated these assignments were for our students according to the ARCS design model. Results reveal that students found the cross-curricular assignment more motivating to complete than the stand-alone assignments. With the digital storytelling assignment, the task was assessed for both technological skills and vocabulary tier understanding. This allowed for the creation of more meaningful digital storytelling which is believed to have made the task more motivating.

Keywords: Motivation, Cross-Curricular Assignments, Digital Storytelling, John Keller ARCS Motivation Model, Pre-service Teachers, Education, Technology Enhanced Assignments

1. Introduction

Technology has become a vital part of our lives as it continues to be integrated into our daily activities both personally and professionally. According to Pew Research conducted in 2019, the vast majority of Americans-96%-now own a cellphone of some kind and around seven-in-ten use social media. With this prevalent access to technology, it is important to effectively use technology in our schools to prepare our students for tomorrow's digital age and careers [6, 17].

One way to ensure the proper integration of technology in our classrooms is effective teacher education programs [1, 8]. To ensure that teachers are sufficiently exposed and aware of technology tools, a separate course that focuses on technology integration is offered at a teacher education program at one

university in the southwest. The course is an introduction to the classroom application of educational technologies.

One of the challenges of offering a separate technology course was to design meaningful and effective assignments. To enhance the quality of the assignments, the faculty tried to provide assignments that supported the following key components of learning that are outlined by Drs. Wallace and Georgina from Minnesota State University: active engagement, participation in groups, frequent interaction, feedback, and connection to content and real-world experts [24]. During this course, students were required to complete both skill-based stand-alone projects as well as cross-curricular assignments.

One of the cross-curricular assignments combined technology used in digital storytelling with knowledge of Tier 1, Tier 2, and Tier 3 vocabulary words.

Digital Storytelling is a way of combining the classical

method of telling a story with different types of media like still images, movies, sound files, and drawings. A typical digital video and digital storytelling assignment includes personal narrative, recreating a historical event, creating a book trailer, or creating stories to instruct or inform [21]. The use of Digital Storytelling has many applications for both students and teachers. As one of the teaching tools, a digital story or video has been noted to motivate students regardless of the class level [2, 16, 23, 21] adds that digital storytelling can be used not only to motivate but also engage both teachers and learners. Furthermore, in another study conducted [4] teachers identified that one of the best features of digital storytelling is its motivational aspect that encourages users to learn more about the subject. "One of the main advantages of digital storytelling is its effect on students' motivational and engagement levels. With the use of digital storytelling, student motivation and engagement levels have been reported to increase" [4]. Additionally, as Bran [3] study suggested, "digital storytelling could attract the students' interest and enhance their learning achievement."

Using Digital Storytelling as an assignment to incorporate technology has shown to be successful in many studies [9, 14]. In 2008, Sadiki completed an experimental study where students were asked to utilize real-world artifacts in a real-world context to create their own digital stories. The results indicated that the Digital Storytelling assignment created a more authentic learning experience for students. In another study [19] the results were similar where the use of digital storytelling with iPods created an authentic learning experience for students. Similarly, in a study conducted by technology in the form of digital storytelling. The results of this study also indicated that the digital storytelling process improved their students' confidence and self-efficacy.

Heo [7] examined the effects of the digital storytelling experience on pre-service teachers' self-efficacy towards educational technology. The results of his study revealed that participants' experience with digital storytelling improved the students' technology competency. In 2014, Kasami [10] used Keller's ARCS Motivation model to investigate if a digital storytelling assignment compared to a traditional essay assignment could motivate students to learn English. The results showed that digital storytelling enhanced the students' motivation to learn English. In this paper, Keller's ARCS model is also used as the conceptual framework to measure motivation comparing a digital storytelling assignment to two stand-alone assignments.

John Keller designed the ARCS Motivation Design as a method to measure and improve the learning process. Keller defines motivation as "What people desire to do, what they choose to do, and they commit to do" [12].

The acronym ARCS is based on four conceptual categories: Attention, Relevance, Confidence, and Satisfaction that are incorporated into a systematic motivation design.

Each category is divided into subcategories to further define each aspect of motivation.

Subcategories for "attention" are curiosity and interest [11]. "Relevance" includes how the instruction relates to learner's

experience and needs [18] "Confidence" includes how positive learners feel in completing tasks for "achieving success" (Keller, 1998), and "Satisfaction" includes how learners feel "awarded" or "satisfied" from a learning experience or for completing a task [18].

2. Purpose

There was a lack of significant research regarding cross-curricular assignments at the collegiate level. This research examining motivation and cross-curricular tasks can help mitigate this dearth of research on the topic. The purpose of this study is to learn if students will be more motivated to complete the cross-curricular assignment, which was the creation of a digital story, compared to the stand-alone assignments, which were the creation of an Excel spreadsheet and the creation of a vocabulary book. We expect our students to see value in combining the skills from both classes to create a meaningful project with real-world use.

The following research questions were formulated:

- 1) How motivated are students to complete the Excel assignment based on the ARCS model?
- 2) How motivated are students to complete the Vocabulary assignment based on the ARCS model?
- 3) How motivated are students to complete the Digital Storytelling assignment based on the ARCS model?
- 4) Are students more motivated to complete a cross-curricular task?

3. Study

This study focuses on a cross-curriculum assignment, digital story that was assigned in two separate courses, an educational technology course and an introduction to literacy course, over a two-year period.

The professors decided to implement an assignment that would be graded in both of their classes since roughly 75% of students taking the technology course also take the literacy class simultaneously.

The introductory literacy course is taken by all pre-service teachers who are seeking an early childhood through grade six certification, while the education technology course is taken by all pre-service teachers, regardless of the certification area.

The professors believed that students would be more motivated to complete an assignment that counted in both classes and would find it more meaningful when compared with the motivation to complete independent assignments.

For the technology-independent assignment, students completed an Excel document using absolute cell references incorporating average and mean formulas. The students used mock data, and the assignment was not integrated into any other course content.

For the literacy assignment, students completed Frayer models of various vocabulary words necessary for an understanding of literacy instruction in the elementary grades. A Frayer model is composed of four parts: a student-created

definition, a non-linguistic representation of the word, examples, and non-examples. Words for this project included terms such as phonological awareness, phonics, digraphs, and stops.

For the education technology course, the technological elements of the digital story were studied while the literacy course focused on the understanding of tiers of vocabulary words. For this assignment, students were asked to design and develop a digital story combining advanced animation, transitions, and audio/video integration.

The digital story assignment had elements required for both courses. The digital storytelling assignment format was similar to the Digital Storytelling model developed at the Center for Digital Storytelling [13]. A student who is not necessarily tech-savvy, develops a short 3-5 minute narrative presentation incorporating graphics, music, video, author's own voice, and transitions. [5] The goal of the assignment was to assess technology skills in creating a professional presentation while incorporating meaningful content from a literacy course.

The literacy course integration component involved vocabulary. Vocabulary can be broken down into three tiers: tier 1, tier 2, and tier 3 words. Tier 1 words are those that are common and do not need to be taught. This includes words like baby and clock. Tier 2 words are those that often add flavor to language and appear in print, such as chortled or scampered. Tier 3 words are those words associated with a specific domain-academic vocabulary. Words such as ion and stratosphere are examples of tier 3 words. In the digital story assignment, students were to create a digital story for the student they tutor in the introduction to literacy class and highlight three examples of tier 1 and tier 2 words in the story. Images 1 and 2 are examples of one student's assignment.

Once students completed each assignment, they completed the motivation survey. This survey follows Keller's ARCS model. The goal was to determine if students were more motivated to complete an assignment that was worth points in two classes compared to the assignments for individual courses.

See two images (Figure 1 and Figure 2) from one of the student's digital story assignment.



Figure 1. Image of digital story assignment.

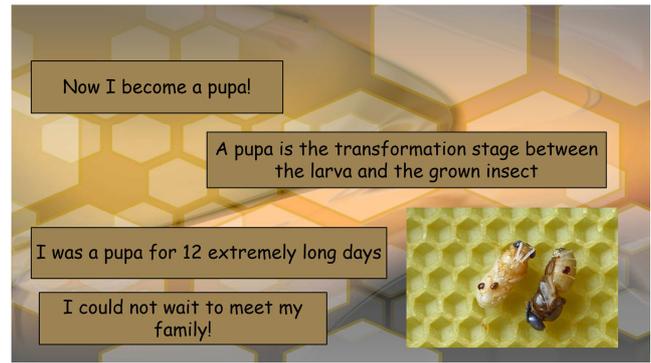


Figure 2. Image of digital story assignment.

4. Method

This study implemented survey research using quantitative data to acquire better insight and understanding of how motivated these assignments were for our students according to the ARCS design model.

The target population of this study was a convenience sample of pre-service teachers who were pursuing their initial teacher licensure in early childhood through grade 6 in the southern United States. There were 39 participants in the study. Of these participants, 29 completed the demographic information at the end of the survey. Of these 29, 28 indicated their racial identity. Of these 28, 23 participants identified as Caucasian, with seven of those identifying as Latino or Hispanic American, two identified as Asian or Asian American, and one identified as African American. One participant identified as other.

Of the 29 participants who answered the demographic items, 28 indicated an age range into which they fell. Of the 28, 13 participants were between the ages of 20 and 24, while nine participants were between 25 and 29. Two students were between 30 and 34, while three were between 35 and 39.

4.1. Instrumentation

In the fall of 2017 upon receiving approval from the Internal Review Board (IRB), students enrolled in the two courses were asked to complete three surveys voluntarily. While questions were similar across all three surveys, one survey measured the motivation participants had regarding the Excel assignment, one survey measured the motivation participants had regarding the vocabulary book project, and one survey measured the motivation of the digital story. Each survey was given after the completion of the respective assignment.

Each survey contained statements representing each facet of the ARCS model: attention, relevance, confidence, and satisfaction. Each statement corresponded with a 5-point Likert scale. A score of 1 on the survey represented "strongly disagree", while a score of 5 indicated that the participant "strongly agree" with the statement. The Excel assignment's, vocabulary book projects, and digital story's surveys contained 19 statements each. Of these 19 Likert scale statements, five assessed attention, five assessed relevance,

five assessed confidence, and four assessed satisfaction. Sample statements students were asked to rate included “after I completed the vocabulary project, I was confident that I could use the information in the future”, “completing the Excel assignment was important to me” and “it felt good to successfully complete the digital story assignment.”

The survey questions were based upon a previous survey [15]. The researchers modified the content of the items by exchanging the constructs for the items being investigated. For example, one question from the Looibach, Peters, et. al. survey was “the user instructions have things that stimulated my curiosity”. The modification of this item read “the digital story assignment stimulated my curiosity”. By closely replicating the language of the previous survey, the researchers maintain that construct validity was preserved. To ensure content validity, researchers worked independently on writing items, then collaborated on final versions of the surveys.

Measures of reliability were performed on all three surveys. For estimating reliability, the researchers chose Cronbach’s alpha coefficient which was calculated using SPSS. All surveys had good internal consistency.

The Excel assignment survey had a Cronbach’s alpha coefficient of .868. The vocabulary project survey had a Cronbach’s alpha coefficient of .837, while the digital story assignment survey had a Cronbach’s alpha coefficient of .892.

4.2. Procedures

Surveys were completed in a classroom on the campus where the participants had class and where the researchers teach. Once instructional time was complete for the course, the researcher verbally explained the purpose of the research and procedures. Participation in the survey was voluntary, and participants were not compensated. Those interested in participating completed consent forms, and the consent forms were collected.

Instructions were verbally explained and included on the survey. Participants completed three surveys: one for the

digital storytelling assignment, one for the Excel assignment, and one for the vocabulary assignment. Once the surveys were complete, students placed their surveys in a folder at the front of the classroom and left the room. Students took roughly 20 minutes to complete the surveys.

Surveys were collected four semesters in the first semester of courses in a pre-service teaching program, which begins in the junior year.

4.3. Limitations of the Study

There are several limitations regarding the sample of participants in this study. The small sample size is a limitation of this study. Furthermore, like many elementary education programs, this majority of this program’s students are white females in their 20’s. All participants were also in the junior year of university study. These limitations prevent generalizations across all groups of students.

5. Results

To answer the first research question, a one sample t-test was used. A hypothetical mean is required, and this value was calculated as follows.

$$\text{Assumed Mean} = 1 + 2 + 3 + 4 + 5/5 = 3$$

In a one sample t-test, mean scores are compared with a constant value, which in this case is the assumed mean value. If the mean score is higher than the assumed mean value, the assumption is that the participants were more motivated by this assignment. If the mean score is lower than the assumed mean value, the assumption is that the participants were less motivated by this assignment. Thus, the null hypothesis was $H_1: u > 3$, with u representing the average mean of the participants’ answers to the items on the survey concerning the Excel assignment. H_0 : The average level of motivation for the Excel assignment is not above average. The results of the t-test and means are shown in the table below. (See Table 1)

Table 1. Excel Assignment.

Excel Assignment	<i>t</i>	<i>df</i>	Sig	Mean	Lower	Upper
Total Motivation	17.510	38	.000**	3.345	3.228	4.125
Attention	14.551	38	.000**	3.200	2.736	3.666
Relevance	16.690	38	.000**	3.550	3.243	4.175
Confidence	18.205	38	.000**	3.796	3.360	4.234
Satisfaction	21.523	38	.000**	4.088	3.663	4.513

*significant at the 0.01 level.

As shown in Table 1, the mean for total motivation on the Excel assignment was 3.345, which is above the hypothetical mean of 3. The level of significance was .000, which is lower than the necessary .005, indicating significance. A t-value of 17.591 is a positive value. Thus, the null hypothesis is rejected, meaning that students’ motivation for this assignment was above average.

Research question two concerned the motivation of the

vocabulary project. Again, the null hypothesis was $H_2: u > 3$, with u representing the average mean of the participants’ answers to the items on the survey for the vocabulary project.

Thus, the null hypothesis was $H_1: u > 3$, with u representing the average mean of the participants’ answers to the items on the survey. The results of the t-test and means are shown in the table below. (See Table 2)

Table 2. Vocabulary Project.

Vocabulary Project	t	df	Sig	Mean	Lower	Upper
Total Motivation	28.301	38	.000**	3.630	3.578	4.138
Attention	23.869	38	.000**	3.462	3.166	3.758
Relevance	36.032	38	.000**	4.170	3.958	4.448
Confidence	22.610	38	.000**	3.734	3.467	4.088
Satisfaction	31.301	38	.000**	4.023	3.758	4.288

*significant at the 0.01 level.

As shown in Table 2, the mean for total motivation on the vocabulary project was 3.630, which is above the hypothetical mean of 3. The level of significance was .000, which is lower than the necessary .005, indicating significance. A t-value of 28.301 is a positive value. Thus, the null hypothesis is rejected, meaning that students' motivation for this assignment was above average.

Research question three concerned the motivation on the

digital story assignment. Again, the null hypothesis was $H_3: u > 3$, with u representing the average mean of the participants' answers to the items on the survey for the vocabulary project. Thus, the null hypothesis was $H_1: u > 3$, with u representing the average mean of the participants' answers to the items on the survey. The results of the t-test and means are shown in the table below. (See Table 3)

Table 3. Digital Story Assignment.

Di Digital Story Assignment	t	df	Sig	Mean	Lower	Upper
Total Motivation	24.108	38	.000**	3.714	3.606	4.323
Attention	22.601	38	.000**	3.625	3.336	4.066
Relevance	22.649	38	.000**	3.971	3.660	4.388
Confidence	24.411	38	.000**	3.961	3.618	4.306
Satisfaction	27.438	38	.000**	4.180	3.928	4.585

*significant at the 0.01 level.

As shown in Table 3, the mean for total motivation on the digital story assignment was 3.714, which is above the hypothetical mean of 3. The level of significance was .000, which is lower than the necessary .005, indicating significance. A t-value of 24.108 is a positive value. Thus, the null hypothesis is rejected, meaning that students' motivation for this assignment was above average.

6. Discussion

When examining the data from all three assignments, the digital story received the highest total motivation mean at 3.714. The Excel assignment and vocabulary book had means of 3.345 and 3.630, respectively. While all of the means are above the assumed mean of 3.0, the digital story mean ranks as the highest overall. Since all assignments were rated above the assumed mean of 3.0, students found all tasks motivating.

When examining the means for the individual components of motivation, more information emerges. With the attention component, students again found the digital story more attention grabbing, with a 3.625 mean, while the Excel assignment and the vocabulary project had values of 3.200 and 3.462, respectively. The researchers believe that the digital story task was more attention grabbing to our particular group of participants since most of them are in their 20's and 30's. Students in these age brackets have been surrounded by technology since birth, and the digital story format allowed them to be creative while using technology. The attention factor could also have been impacted by the cross-curricular nature of the assignment. Cross-curricular work is unusual at the collegiate level, and this could have

sparked more attention to the assignment. While the Excel assignment used technology, it did not have the creative bent that the digital story had, which may have hampered its ability to grab the attention of our participants.

When examining the relevance component, the Excel assignment garnered at 3.550, the vocabulary book a 4.170, and the digital story a 3.971. When considering the scores for this facet of motivation, it is important to note that the vocabulary project focused on terms the participants needed to understand to pass the course. Perhaps this immediate need to learn and apply the information is the reason this score was the highest. While the digital story and Excel spreadsheet certainly have their places in classroom use, our participants were pre-service teachers, which may have impacted the relevance for these assignments to them.

The confidence facet showed that participants rated the Excel assignment with a 3.796, the vocabulary project with a 3.734, and the digital story a 3.961. Again, the researchers hypothesize that this rating is influenced by the age of the participants in the study.

Given the younger generation's comfort with technology, it is not surprising that both technology assignments rated highly on the confidence factor. The vocabulary project was only slightly behind the Excel assignment with regards to confidence.

All assignments rated highly in the area of satisfaction, with the Excel assignment rating 4.088, the vocabulary project rating 4.023, and the digital story rating 4.180. Thus, participants were most satisfied with the completion of the digital story assignment. Again, this satisfaction could well have been to the cross-curricular nature of the assignment.

This assignment was not the most difficult or time consuming to complete, so this particular facet of motivation could have been impacted by its importance in both courses.

Overall, each of the three assignments rated motivating when compared with the assumed mean. In this case, the cross-curricular assignment did prove to be the most motivating when comparing the mean scores of the motivation surveys.

When examining the data from all three assignments, the digital story received the highest total motivation mean at 3.714. The Excel assignment and vocabulary book had means of 3.345 and 3.63, respectively. While all of the means are above the assumed mean of 3.0, the digital story mean ranks as the highest overall. Since all assignments were rated above the assumed mean of 3.0 students found all tasks motivating.

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Overall, each of the three assignments rated motivating when compared with the assumed mean. In this case, the cross-curricular assignment did prove to be the most motivating when comparing the mean scores of the motivation surveys.

7. Conclusion

According to the ARCS model survey, the students were more motivated to complete the digital story assignment than the Excel assignment and the vocabulary project. In this case, the digital story was the cross-curricular assignment, while the Excel and vocabulary assignments were limited to just one class. For the Excel assignment and the vocabulary assignment, skills were assessed by the individual professor, and grades were given in the individual course. With the digital storytelling assignment, the task was assessed for both technological skills and vocabulary tier understanding. This allowed for the creation of more meaningful digital storytelling which is believed to have made the task more motivating.

For pre-service teachers to acquire more technology skills and become more knowledgeable about content, we plan to develop more cross-curricular assignments.

There are several avenues where research could build on the findings of this study. First of all, studies with larger sample sizes would be beneficial. Larger universities with larger programs could certainly measure the impacts of cross-curricular assignments in a more timely fashion. Future research could also include assignments incorporating various content areas, perhaps even expanding the research into academic programs outside of schools and colleges of education. Finally, studies could also examine the academic factor, including the academic knowledge gains of cross-curricular assignments.

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