SERENDIPITOUS FACULTY DEVELOPMENT THROUGH INFOGRAPHIC ACTIVE LEARNING EXPLORATION

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ABSTRACT

This study explores two important college classroom events. First, is enhancing student engagement using a more active learning technique, which is distinctively different than the instructor's traditional didactic and discussion format. Second, is the specific utility of integrating appropriate, relevant and meaningful (ARM) technology, such as an Infographic as an active learning assessment tool. Students in an introductory Criminal Justice class were assigned Infographics as a way to collaborate and as an alternative assessment to a final exam. Results demonstrate that the Infographic provides a meaningful experience for both the professor and the student. Students ultimately connected with the material in a more authentic way, and they learned to collaborate with their colleagues to produce a thoughtful, informative, and attractive artifact. Students also felt that the Infographic was a meaningful way to attain, synthesize and ultimately express knowledge.

Keywords: Active learning, Collaboration, ARM Instructional Technology, Infographics.

INTRODUCTION

While the intent of incorporating the active learning Infographic session in class was to help reinforce student learning, the process actually ended up as a challenge to current traditional teaching methods. Several salient lessons were learned as a result of this process, including how assessment might be employed in non-traditional ways and how the assessment of learning might be captured by simply asking students along the way.

The university has a diverse student body, one of the most diverse in the country. The student body includes a mix that is 37% Asian and 20% Native Hawaiian or Pacific Islander. These are students that are traditionally more passive in the learning process and are typically quiet in class and have a long history of success in informal learning settings. Informal settings are typically places where learning takes place in museums, zoos, aquaria, science and technology centers, homes, and clubs. They are also characterized where motivation is internal, the content is variable and possibly unsequenced, attendance is voluntary, displays and objects are provided, learners are of all ages, and there is more diversity in the learners' backgrounds (Hargis, 2001). The level of outward engagement in a formal classroom setting among these students is often low. Thus, understanding which and in what way active learning strategies might better engage students is especially important in this setting. In addition to lack of engagement, students also tend to have a lack of collaborative experience, the type of experience likely to benefit them in life and in the workplace.

The instructor's experience with a more non-linear approach to teaching and learning began with a freshman introductory criminal justice systems course. This class is normally taught via lecture, some discussion and then assessment follows in the form of traditional multiple-choice and short response questions. This has been the approach for many years and has led to adequate success using the available measures, such as student

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satisfaction surveys. However, for fun and embracing the philosophy of continuous improvement, the instructor decided to divide the class (two sections of the same course) into groups of four students each and have each group create non-graded Infographics at the end of sharing a content section. It was hypothesized that this would be an enjoyable way to capture what students retained and could apply in a graphical form, important concepts from the current section. Upon implementation of the Infographic, two outcomes were quickly realized. First, many of the freshman students did not know how to collaborate and therefore did not engage in productive conversations. Second, the students were not able to identify and make sense of the major points of the section in a way that was expected. This experience turned the primary author into an experimenter of teaching and learning, which diverter her from the traditional, linear route of content delivery.

The current study stems from this initial experience. Upon reflection, the instructor realized that she never asked students in this freshman class if they knew or took away certain concepts (outside of the traditional exam assessment) yet she suddenly expected them to replicate this information into an Infographic. Thus, the findings from this initial foray into Infographics allowed serendipitous findings to emerge, similar to what is likely with any instructor moving from lecture to active learning. The true power of this initial exercise is exploring failure and how to translate this into success for students. In addition, a powerful outcome was the ability for the instructor to become a social scientist and use their classroom as a laboratory to explore possible ways to attain their instructor goal to enhance student outcomes.
This largely qualitative, exploratory study focusses on two overriding questions.

1. Which teaching methods can most effectively engage students in meaningful collaboration, essential to 21st century skills.
2. What is the potential utility of Infographic as an assessment tool, primarily to address knowledge, skills, and overall learner disposition?

LITERATURE REVIEW

Faculty development
Although faculty development has been available on many university campuses throughout time, the publication of Ernest Boyer's Scholarship Reconsidered (1990) provided a clear roadmap and rationale for an additional approach to faculty development. In this landmark book, Boyer extended the definition of traditional scholarship of discovery, adding three other important ways to contribute to the academe. The additional three types included the scholarship of application, integration and teaching and learning, of which this is the foundation for this study. At our particular comprehensive university, Boyer's model has been overtly integrated into the faculty handbook in the section of research, so the author's choice to explore this model aligned well with the university mission and was publically valued in their promotion and tenure process. In the Scholarship of Teaching and Learning (SoTL) model, Boyer emphasizes the similarities between SoTL and traditional research methodology. SoTL, therefore maintains rigor, is systematic, and evidence-based. The ultimate goal is to better understand and subsequently improve student learning and instructional strategies. SoTL maintains the academic standards of peer-review and public dissemination, which will advance the field of teaching and learning to build collective knowledge and ongoing improvement (Christensen & Mighty, 2010).

Twenty-five years after Boyer's work, although some of the myths of SoTL has been addressed, the challenge of faculty time, disposition towards trying new methods, which might fail, and the ability to identify and integrate appropriate innovative teaching methods into their teaching and learning persist. In a ten year study observing faculty from three different universities, Hargis (2014a) found that initially faculty were apprehensive to try new approach to their teaching. However, after debriefing conversations and identifying potential active learning methods, which align well with the instructor's teaching philosophy and discipline, faculty were able to integrate active learning successfully. One of the major attributes defined by Yee and Hargis (2012), that was observed to increase engagement in faculty development was the role of sociability. The connection to the traditional learning triangle (student, teacher, content) was expanded to include the

role of faculty development, as it was promoted through relationship building and identifying specific, targeted active learning methods.

Active Learning

Active learning is certainly not a new concept to education, as many believe that most learning began with active learning. Before formal education, and even now before young learners enter schools, they engage in active learning. This paper will not attempt to retrace the long history of active learning, but to move quickly to its potential in the context of this study. Faust and Paulson (1998) defined active learning as is anything that students do in a classroom other than merely passively listening to an instructor's lecture. This operational definition opens the door to many interpretations, which can one of the major advantages of active learning - the ability to cater to the specifics of a particular faculty members approach and their students abilities, aptitudes and engagement. One of the major goals of active learning is to help students develop a deeper ability to apply conceptual frameworks by interacting with and reflecting upon the ideas (Angelo, & Cross, 1993). The intent is to provide an environment to scaffold students transition from passive receivers to doers. Fortunately, there are many ways to create active learning opportunities. Also fortunate for organization, activities may take minutes or the entire class period and may involve students as individuals or in collaborative groups (Bain, 2004).

Collaboration is one powerful active learning method. The ability for peer-to-peer learning and sharing can be, at times, allow students to both rehearse and present themselves as a teacher, as their colleagues attend to their message differently than they might an instructor. There are several challenges to productive collaborate work, which might include time, classroom management, the dynamics of team members and the ability to secure appropriate skills sets (including social emotional competencies) and diversity in each group (Barkely, Cross, & Howell Major, 2005). When well-organized, collaboration, has the ability to increase engagement, attention, information processing and many of the 21st century skills, which are needed in the innovative career positions (Davis, 2009). One way to connect students to each other in collaborate groups is the use of appropriate, relevant and meaningful (ARM) instructional technology.

ARM Instructional Technology

Education or instructional technology has seen an increasing role in teaching and learning over the past several decades. In this paper, we will discuss this concept in a specific manner, which we term, ARM Instructional Technology (IT). The ARM is an acronym for Appropriate, Relevant and Meaningful. It has become apparent that many faculty may be resistant of using technology for technology's sake, so we operationalize this term to include only technology that meets the conditions of ARM. Hargis (2014b) has created a template to share with faculty on how to integrate a strategic plan for integrating ARM instructional technology. Much of this approach focuses on the instructor's teaching philosophy, their abilities in the area of technology as well as the type of technology, which are available to students, as well as their abilities. One of the many challenges for integrating ARM IT is the difficulty to measure student behavior, interaction and ultimately how ARM IT might affect their abilities in the area of knowledge, skills and disposition One specific example that addresses this is a large mobile learning initiative, whose goal was to increase student engagement (Hargis, Cavanaugh, Kamali, & Soto, 2013). In this study, the authors identified key attributes, and unique methods to capture both qualitative and quantitative data in a triangulation method to determine how the mobile learning device and more importantly the change in instructional strategies affected student engagement. Many studies such as this include complex methods of data gathering and analysis, as well as require a concise way to collate and share the findings. To accomplish this, the authors need to fully understand the study and all of the potential permutations. This type of synthetic activity is precisely the type, which instructors are attempting to provide to students. A useful technique to capture this activity is an Infographic. Infographic are a relatively new and are innovative way to integrate ARM IT into and beyond the formal classroom learning environment. They can help you simplify a complicated subject by adding interactive, easy to read graphics. Infographics compress and display information in a clear way. They communicate complex data quickly and clearly in attempt to be effective to a large audience. This approach is especially helpful to second language learners.

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METHODOLOGY

Two main Research Questions (RQ) guide this study:
RQ1: Which teaching methods can most effectively engage students in meaningful collaboration, essential to 21st century skills?
RQ2: What is the potential utility of Infographic as an assessment tool, primarily to address knowledge, skills, and overall learner disposition?

Session #1

Students were assigned three Infographics over the course of the 16 week term. For the first Infographic, students were assigned to a group by counting from one to four in the first section and one to five in the second section of the course. All groups contained four members. Students were shown several examples of Infographics on the topic of criminal justice. They were also provided Infographic templates in a Power Point format, as well as, two online web sites they might use to create free Infographics (Canva & Piktochart, 2015). Students were then provided with the following prompt:

"I am from another country and not familiar with America. Tell me about law enforcement in America."

The students were given ten minutes to brainstorm in their groups, and then 55 minutes of remaining class time to create a draft Infographic. At the end of class, each group emailed their final Infographic artifact to the instructor. Students were aware that this initial Infographic would not be graded.

Session #2

Drawing from the initial Infographic in-class experience, students were again assigned Infographics at a second point in the term and remained in the same groups as they had with their first Infographic assignment. The students were again provided templates in Power Point or they could use one of the two online sites as before. Students were asked to create two Infographics for this session, which would count as the traditional final exam for this class. The prompts for these two artifacts contained greater guidance than at session number one. Students had the last day of regular class (one hour and twenty minutes) and the full final exam period (two hours) to create their final two infographics. Following were the prompts:

Infographic 1: Create an Infographic that informs the public about jails and prisons in the U.S. Make sure to address the following:
- What are the differences between jail and prison?
- Who runs each?
- What type of population is in each?
- What changes in the population have occurred over the past 40 years?
- Are there other interesting facts about jails and prisons that should be presented?

Infographic 2: Create an infographic that informs the public about probation and parole in the U.S. Make sure to address the following:
- What are the differences between probation and parole?
- What is the function of each?
- How do you get there?
- What changes in the population have occurred over the past 40 years?
- Are there other interesting facts about probation and parole that should be presented?

Students were again instructed to email both of their final products to the instructor, before the end of the exam period. From lessons learned during the initial non-graded Infographic activity, three main differences were employed for the second session.

1.   Students were graded on this infographic, as it replaced their traditional final exam.

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2. Students were provided more detail in their prompts to help keep them focused.
3. Additional time was spent discussing collaboration and the importance of this skill to their overall professional development.

Finally, students filled out a short, five question open-ended exit survey once they completed their Infographic to further assist the instructor on the effectiveness of this active learning and assessment tool.

RESULTS

Results - Session #1

Upon reflection on this first Infographic session, two primary observations became apparent and useful. First, in general, students could not develop a storyline, they missed the big picture around the structure and roles of American law enforcement, and information. Students could derive small portions of relevant concepts, however, a salient take-away message was lacking. Second, many students simply did not know how to collaborate, brainstorm, and otherwise work effectively as a group. This lack of collaborative ability came at the cost of students' ability to utilize the limited time available to complete the project.

Some students were either outwardly stressed or vocalized their stress during the creation of the initial Infographic. Some students did not want to be in a group or their particular assigned group, and vocalized this as well. They found it difficult to work under the time constraint during this first Infographic session. In short, many were frustrated by the authentic process. They often lost focus on the overall task at hand and thus had difficulty effectively communicating what they did know.

The lesson for the instructor was that she could have reinforced the big picture along the way, scaffolding student schema as they advanced through a conceptual framework. Prior to the first artifact she could have discussed the importance of effective collaboration more, and how to collaborate on group projects, perhaps modeling with her colleagues. Students comments at the debrief included their desire that the instructor remind them in person to bring computers to class, rather than via email; they wanted greater direction from the instructor regarding what was expected from them; and they wanted more in-class time to work on this project.

Shortly following the first Infographic and completion of this section of the course, the students had a traditional mid-term exam consisting of multiple choice and short answer questions. Upon completion of the exam, students were asked whether the Infographic helped them prepare for the exam. Half of the 36 students (50%) stated that it did not, 32.4% said it helped a little, and 17.6% said it did help. The average score on the exam was a C, or 76%, which was typical for this class taught by this instructor over the past ten years. However, the instructor hoped that the information required for the Infographic would have increased this score. In addition, outcomes she had hoped to see on the Infographic was ultimately the most important information she reinforced and knew they needed after the class ended. This also led the instructor to re-evaluate the exam versus a more authentic assessment. This experiment led the instructor to believe that the multiple choice exam was not an authentic, nor appropriate assessment of the material or to assess the outcomes that she knew was needed in the field.

Results - Session #2

Results at session two varied significantly compared to the first Infographic session. During the second Infographic session, which was a two-part session, students seemed focused, in general and in terms of what was expected, and did not exhibit the stress witnessed during the first session. The process itself did not inhibit them. Although this took place at the end of the term, students seemed to enjoy and appreciate the process, certainly more than they would a traditional exam. Collaboration was much improved. Students in every group contributed to the team project by either creating the physical artifact, looking up statistics, discussing how to package certain bits of information, and reviewing and commenting on drafts. They were actively seeking facts, charts, and graphs that appealed to them and the story they wanted to tell.

As an example, Appendix 1 of this article includes a session one Infographic from one group to a session two from the same group. This is the group that clearly had the least effective collaborative skills during the first session. However, the improvement from session one to session two can be seen in the second Infographic created by that same group. All groups nonetheless improved from session one to two.

Overall, improved results at session two seem to be related to four important factors. First, the Infographic was no longer a novelty, the students had previously been exposed to and created one earlier in the term. Almost all of the 36 students (97.2%) indicated that the Infographic was easier during this second iteration than the first. Students noted the following in response to whether session two was indeed easier:

- "...I had a better understanding on how to make an Infographic. The first time around was hard because I wasn't sure on how to make one."
- "It was much easier the second time because I think we knew better what to expect."
- "We had practice with the first one and went over as a class as to what you were looking for in an Infographic. Seeing the other groups Infographics as examples of what not to do/what do do helped a lot."

Secondly, more context was provided in the prompts for these last two Infographics. The prompt was more detailed and served to concentrate the students on what the instructor really wanted them to demonstrate via their Infographic project, thus engendering a much more transparent process compared to time one. The Following are comments from two students:

- "The infographic was easier [the second time] because you gave us more of a direction to go in" and
- "...we knew what to do and had an idea of what you were looking for."

The students did not need the answer, but they needed a better guide about where to move forward.
Third, after session one, some class time was devoted to discussion of the importance of collaboration in real world settings, and the importance of working as a team. Particular emphasis centered on the need to draw on the strengths of individuals within the group when meeting project deadlines. At the end of this second session, marked improvements were observed. Students also commented,

- "My group personally knew we needed to work together and communicate more" and
- "...working in groups helps me more in the real world of working with others efficiently."

Students certainly seemed to better internalize the importance of collaboration and demonstrated an improved ability to do so.

Fourth, the final two infographics served as their final assessment for the course, so grades mattered at session two project, but did not during session one. Most students (88.9%) responded that they preferred the Infographic assignment over a final exam. In general, they believed the infographic was more hands-on, helped them remember, was more focused, and enhanced their team building skills. Students noted the following:

- "...it was a real-life application of information we were taught and researched"
- "...it allows us to understand the information better and process what we think is most important."
- "...because I feel like you learn the important parts and the information sticks, compared to exams, most students data dump"
- "...it helps develop team working skills, communication, and adaptability to different situations."

About three-quarters of the students (77.1%) responded that they believed the Infographic, over the exam, best allowed them to demonstrate and apply their knowledge. Here is a comment from one student,

- "If we could do an Infographic for each topic, it would demonstrate more knowledge because you would need to portray the information in your own words to someone who might not understand."

Other students commented on the importance of the infographic in terms of knowledge demonstration:

- "[Infographic is important]...because we have to decide for ourselves what information is important."
- "...it is a hands on understanding of the information as opposed to the regurgitation of information"

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- "I feel that an Infographic best allows you to demonstrate knowledge gained because an Infographic is used to inform others of certain information and etc. knowledge is needed in order to complete the Infographic."

Further, the majority of the students (84.8%) stated that they believed the Infographic would help them retain information better. In terms of retention, students commented,
- "I always forget exams but Infographics leave a lasting impression" and
- "Infographic actually did help me retain information. I am a visual learner and the pictures and graphs helped me retain/remember information"

Finally, a full 91.4% of the students believed that they would be able to apply what they learned in the Infographic process in the future. Students noted:
- "Research, teamwork, and important criminal justice system facts are all things I learned and can apply in the future"
- "...it teaches teamwork and presentation skills"
- "... to the aspects of working environments and professional places or situation in which you must work with others."

Again, students seemed to get the value of the group-based Infographic project as a means to develop teambuilding and collaboration skills as well as use critical thinking skills to present salient, key facts to others.

An important serendipitous outcome for the instructor was engagement with a more authentic assessment. Both of the Infographics at time two included prompts that would allow students to demonstrate the most important elements of this portion of the class. Students came prepared, but, as in the real world, they had access to each other, their notes, book, and the internet to enhance the story they wanted to tell through the infographic. They believed that the Infographic forced them to focus on the key elements of the topic and to engage in critical thinking to determine the most important pieces of information to convey. This is truly an important part of an authentic assessment as well. A rubric was adopted to formally assess the students and is located in Appendix 2 of this article for reference.

DISCUSSION AND CONCLUSION

The process of moving from a traditional lecture to a group-based learning and assessment via the Infographic provided a springboard for having conversations with students that the instructor had not previously had. It was as if the environment needed to be disrupted to really see the importance of these conversations with the students. The vulnerability of this professor, and her willingness to take chances, and make and embrace mistakes, also seemed to resonate with the students and get them to open up as well. In short, Infographics improved collaboration and conversation in the classroom.

Clearly the active learning strategy employed here better and more effectively engaged the students, better focused the students on salient material at hand, and taught the professor the need to stop and reflect during all course sessions, regardless of the nature of the course. These are also skills that are perhaps as important as knowledge acquisition, yet ones that seem to be lost via a traditional method of teaching. In this case, the importance of teaching collaboration in the classroom is an important one. The instructor previously took it for granted that students knew how to collaborate with one another in project based learning assignments. Unfortunately, many students do not currently possess these critical skills. This is certainly a skill that employers look for, and one we should be engendering throughout the student's undergraduate educational experience.

The students also believed that these Infographics helped them retain information better and that would be more likely to remember the material from these assessments. They also believed that they learned skills that they could apply in future work and other endeavors. In addition to collaborative skills, they feel better able to

focus on salient issues around a topic that is otherwise complex and full of details. They had to learn to siphon out key facts in order to create effective, informative, and appealing infographics.

The instructor would suggest that anyone wishing to try an Infographic for the first time build in class practice time first. This will reduce the potential negative novelty effect for the students, and will also help the instructor develop adequate prompts. Utilizing the Infographic as a graded artifact is also likely to make students more serious about the project. In the appropriate situation, though, this is clearly an authentic assessment method.

LIMITATIONS

There are several limitations to this exploratory study. First, this primary author is a novice at the Scholarship of Teaching and Learning (SoTL). As such, she did not start the term with a study in mind. The study emerged naturally during the course of the term (although this could be seen as a strength as being open to exploring alternative teaching methods in the future). As such, a stronger design method was not employed. The first Infographic was a non-graded assignment and had much novelty for both the students and instructor. Prompts were changed, based on student feedback, from the first session to the two Infographics created for the final course assessment. Nonetheless, important lessons were learned during the course of this work, ones likely to enhance active learning, engagement, and collaboration in the college classroom.

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APPENDIX ONE - **Before and After Artifact**
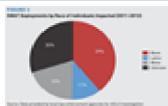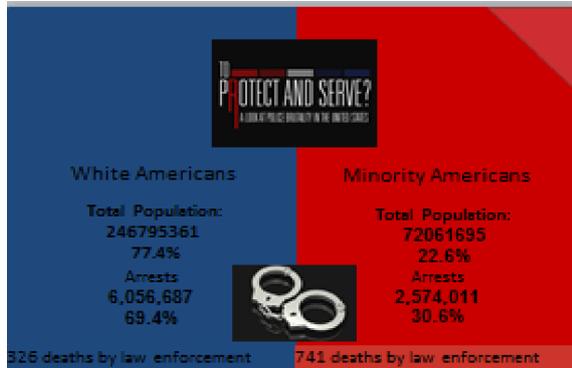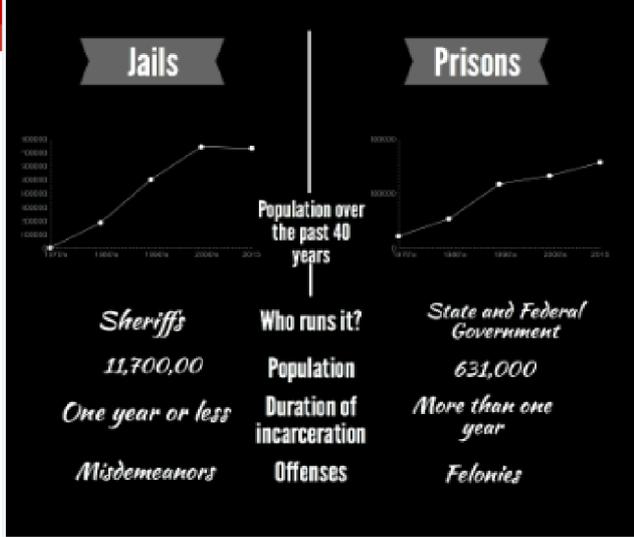
APPENDIX TWO - Infographic Rubric

CJ 151 Infographic Rubric

Category	(Excellent)	(Very good)	(Satisfactory)	(Unsatisfactory)
Use of Class Time (10 points)	Used time well during class period. Focused on getting the project done. Did not distract others.	Used time well during class period. Usually focused on getting the project done and did not distract others.	Used some of the time well during the class period. There was some focus on getting the project done but occasionally distracted others.	Did not use class time to focus on the project OR often distracted others.
Graphics – Relevance (6 points)	All graphics are related to the topic and make it easier to understand.	All graphics are related to the topic and most make it easier to understand.	All graphics relate to the topic.	Graphics do not relate to the topic.
Content –Accuracy (10 points)	At least 4 accurate facts are displayed on the infographic.	3 accurate facts are displayed on the infographic.	2 accurate facts are displayed on the infographic.	Less than 2 accurate facts are displayed on the infographic.
Attractiveness (7 points)	The infographic is exceptionally attractive in terms of design, layout, and neatness.	The infographic is attractive in terms of design, layout and neatness.	The infographic is acceptably attractive though it may be a bit messy.	The infographic is distractingly messy or very poorly designed. It is not attractive.
Infographic is neat and well organized (7 points)	All graphics and text used are well organized; graphic color, shape, size, and arrangement contribute meaning to the overall message.	Most (at least 76%) of graphics and text used are well organized; graphic color, shape, size, and arrangement contribute some meaning to the overall message.	50-75% of graphics and text used are well organized; graphic color, shape, size, and arrangement are present but do not really add meaning to the overall message.	Less than 50% of graphics and text used are well organized; graphic color, shape, size, and arrangement are distracting or misleading.
Details are provided (6 points)	Details, including labels, support the main idea without distracting clutter.	Detail is added to support main idea with minimal clutter.	Details are minimal and do not aid in promoting understanding of the data; some details are distracting.	Little to no detail is provided for the main ideas; understanding is very limited.
Mechanics & Grammar (6 points)	Consistently contains accurate and proper grammatical conventions, spelling, and punctuation.	Contains accurate and proper grammatical conventions, spelling, and punctuation most of the time; errors do not interfere with infographic's meaning.	Contains frequent errors in grammatical conventions, spelling, and punctuation that interfere with reading content.	Contains numerous errors in grammatical conventions, spelling, and punctuation that substantially interfere with reading the content.

Note: the absence of any one category will result in a zero for that score. A student who is part of a group but not in class for the infographic creation will receive a 0 for the project. He/she will not receive the credit based on the effort of the other team members.

Sources for rubric:
http://www.truwebs.com/csu/ete567/webquest/docs/Infographic_Rubric.pdf
http://www.excelsior.edu/static/syllabus/rubrics/SHS_PBH647_Infographics_Assignment_Rubric_Final.pdf