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Infographics: The New 5-Paragraph Essay

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ABSTRACT

The STEM Career Infographic Project (SCIP) was a 5-week exploratory project deployed in an 8th grade classroom at Mountain Vista Middle School (MVMS) in the spring of 2014. Students were required to research a STEM career in-depth, then report on their careers using infographics, in lieu of a standard 5-paragraph essay. SCIP was broken down into 9 days of instruction: introduction, research, three days of design lecture, three work days, and a final presentation day. The students were in the lab working on their infographics every day. We observed that infographics were better suited than traditional essays in areas that involved creativity and visual appeal, limited writing for ESL (English as a Second Language) students, fostering and appealing to student's interests, and overall student enjoyment. Some of the negative obstacles we encountered revolved around limitations of free and online software, addressing the learning curve of technology, and altering student's expectations of reporting tools. Overall, we considered SCIP a success because of the positive affect we recognized in the students through the duration of the project.

Keywords

Infographics, Middle school education, STEM education, computing education

1. INTRODUCTION

Infographics have permeated our culture as a leading form of information display and communication. They can be seen everywhere from business and news to social media websites. Infographics are also unique, since they combine beautiful visualization with an impactful way to deliver direct information. It has been demonstrated that infographics can be used to advise non-expert audiences so they can make informed decisions [1]. They have also been used as an extremely effective communication tool over traditional tools such as email and reports [4].

The attraction of infographics seems to be inherent within their nature, since people are drawn to the visualizations, colors, and images they provide [6]. An infographic can transfer knowledge about a topic faster and more effectively than pure text; however, this condition is dependent on the quality and presentation of the infographic.

Edward Tufte is one of the most renowned people working the area of data visualization. His work revolves around the idea of displaying information in a visually interesting and minimalistic fashion, while simultaneously effectively communicating its purpose. With the increasing popularity of infographics, there has been an increase of books published about creating effective infographics with Tufte's ideals in mind [3][5]. These books give

guidelines to creating presentations for targeted audiences while demonstrating data in a compelling manner.

Despite the popularity of infographics in the public realm, there has been little research addressing the potency of infographics as a learning tool. Vanichvasin conducted a study with fourth-year university students, where infographics were used a visual communication tool in a Business class [7]. Results from the study showed that infographics have the potential to enhance appeal of the course, yield a positive impact, and enhance the quality of learning.

Krauss advocates the use of infographics in K-12 classrooms in her paper *Infographics: More Than Words Can Say* [2]. She lists five simple steps to follow when creating an infographic, and gives example projects where infographics can be used in the classroom.

Aside from these two articles, we have found very little research regarding using infographics in K-12 level as a learning tool. We aim to further the research listed here by showing that infographics can be an appropriate and advantageous tool for reporting at the middle school level.

2. PROJECT DESCRIPTION

In the 2013-2014 school year, we designed an infographic activity called "the STEM Careers Infographic Project" (SCIP) and deployed it at Mountain Vista Middle School (MVMS)¹ in the St. Vrain Valley School District in Longmont, Colorado.

2.1 SCIP logistics and student demographics

The first author, Kos, created the curriculum and was the primary instructor, while the second author, Sims, helped facilitate SCIP in her 8th grade classes. The project was given to the students at the end of the spring semester, after all standardized testing had concluded. Sims was responsible for teaching 6 classes, with around 30 students per class, so we had an estimated 180 students participating in SCIP.

The make-up of MVMS is very diverse culturally and economically. SVVSD reports 48% of their students qualify for free or reduced lunch and according to a demographic survey sent out at the beginning of this project, 53% of the students reported being Hispanic/Latino(a), 38% Caucasian, and 9% reported other ethnicities².

¹ For privacy reasons, the name of the school has been changed.

² Students who reported both Caucasian and Hispanic were grouped into the Hispanic category. No students reported both Caucasian and another ethnicity.

2.2 Content

The SCIP curriculum was focused on researching, analyzing, and reporting on STEM careers. MVMS is a “STEM school”, which means the students are required to take at least one STEM class a semester, in addition to their regular core and elective classes. These classes range from robotics, CSI, game design, digital media, animation, and craft technology; however, often these classes only cover the curriculum and rarely touch on the greater implications these fields can have in terms of careers or jobs. SCIP extends what the students have experienced in their STEM classes and lets them research what potential careers could be in these areas.

We provided the students with a list of STEM careers in different fields, each requiring different levels of education (vocational, bachelors, masters, and doctorate degrees). The students picked one career off the list (students were not allowed to pick the same career twice) and were required to research and study that career in-depth. Instead of reporting about this career through traditional means, such as a 5-paragraph essay, the students were required to create infographics about their subject. The goal of the project was to teach the students about this new form of communication, and for them to use their infographic to teach other students about their STEM career in a final presentation.

2.3 Curriculum

SCIP required 9 days to complete. MVMS has block scheduling, with periods lasting 1 hour and 15 minutes long, so we would estimate SCIP took 4-weeks of class time for the total project. To keep the students on track, each day (except the first and last) had a deliverable for the students to “turn-in”.

Day 1: Introduction

The first part of the day was spent introducing what infographics are and showing the students good and bad examples. The remainder of the class was spent teaching the students about the difference between the four levels of education we offer for the STEM careers.

Day 2: Research

The students selected their STEM careers and started researching. We gave them research prompts if they were stuck, but this activity was mostly self-driven. The deliverable was a list of 20 facts they could use to put on their infographic.

Day 3: Organization and flow of information

This was the first of a set of three lectures that focused on how to group and organize facts. We used the structure of a 5-paragraph essay as a comparison point (see Figure 1. 5-Paragraph essay structure vs. infographic structure), so the students were expected to organize their infographic like they would a language arts essay. The activity for the day had the students organizing their facts into categories, and then creating sections for their infographic, much like an outline in an essay.

Day 4: Design: Text and colors

Lecture #2 focused on design basics, such as grid layout, complementary colors, and typography. After lecture, we moved to the computer lab, and introduced the online tools the students could use to create their infographics. The daily deliverable involved creating a new infographic, selecting a template, and starting transferring the previous day’s outline into the computer.

Day 5: Design: Graphs and pictures

Lecture #3 taught the students how to create good graphs and how

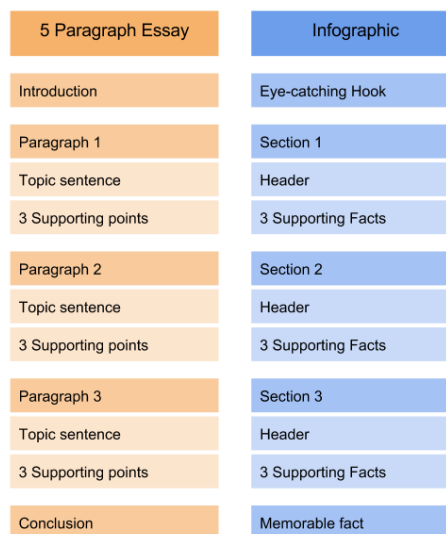


Figure 1. 5-Paragraph essay structure vs. infographic structure

to find royalty-free pictures they could use legally. The daily deliverable had the students creating 1 graph or chart and finding 2 pictures to use in their infographics.

Day 6: Work day

The students worked on their infographics and completed a rough draft by the end of the day.

Day 7: Peer reviews and work day

Students partnered together, gave constructive feedback on each other’s infographics, and graded each one another based on the grading rubrics.

Day 8: Final work day

This was the final work day for the students. They were expected to complete their infographics by the end of the period and share it with the instructors.

Day 9: Presentations

The students presented their infographics in front of the class.

2.4 Grading

Two rubrics were used to grade the infographics. The content and information rubric (see Table 1. Content and Information Rubric) focused on what kind of information was in the infographic.

Table 1. Content and Information Rubric

	Facts	Graphs	Pictures	Sources
A	10 (written in complete thoughts)	2 graphs (all with complete labels)	3	4
B	8 (written in complete thoughts)	2 graphs (1 with complete labels, 1 incomplete labels)	2	3
C	6 (written in complete thoughts)	1 graph (with complete labels)	1	2

The design and esthetic rubric (see Table 2. Design and Esthetic Rubric) focused on what the infographic looked like. This was an important piece of the assignment, since the visualization of an infographic is what sells and communicates the ideas.

Table 2. Design and Esthetic Rubric

	Readability	Emphasis	Simplicity	Consistency
A	Everything (text, graphs, pictures) is 100% readable	2 or less points of emphasis	All information has a purpose	All colors and the overall design match
B	Some parts may be difficult to read because of text color or backgrounds	3-4 points of emphasis	Some information does not have a clear purpose	A few colors are out of place, but overall fairly consistent
C	Most parts are readable, but a large number of text or graphics are not	5 or more points of emphasis	Quite a bit of extra information without a purpose	Quite a few colors or design choices do not match

The project was worth a total of 200 points, with 50% devoted to the daily deliverables and the remaining 50% devoted to the final infographic (see Table 3. Grade break-down).

Table 3. Grade break-down

Homework	Points	% of Grade
Day 2: 20 Facts	20	10%
Day 3: Infographic outline	12	6%
Day 4: Initial design on computer	12	6%
Day 5: 1 graph/2 pictures	14	7%
Day 6: Rough draft	14	7%
Day 7: Peer Review	14	7%
Day 8: Final Draft	14	7%
Information/Content Rubric	50	25%
Design/Esthetic Rubric	50	25%
200 points total (50% Homeworks and 50% Final Infographic)		

3. ADVANTAGES OF INFOGRAPHICS

One of the primary goals of SCIP was to introduce the idea of creating infographics as an information delivery tool, in lieu of a 5-paragraph essay. The students were skeptical about the idea initially, however, we and the students quickly discovered many benefits to this project, which we will list here.

3.1 Creativity and visual appeal

The online infographic creation websites offer a wide range of tools to create an infographic from scratch, but at the same time many of the websites also offer templates, so one does not have to create the entire design by themselves. We found this was a great solution for students who had a wide range of creative and technical abilities. SCIP required the infographics to be visually appealing, but also offered flexibility in the amount of imaginativeness students could put into their projects. This allowed for all students to have some manner of success, regardless of artistic talent. We also found infographics afforded a diverse, and often preferable, way to convey facts and data that a 5-paragraph essay does not offer. We saw students including pictures or images to demonstrate their ideas, instead of typing out long explanations. The old adage stating “A picture is worth 1,000 words” was truly put to the test with SCIP. Students were very receptive of the idea that they could use other forms of communication instead of writing and still communicate their ideas.

3.2 Limited writing for students

Infographics, by nature, require less writing than a traditional 5-paragraph essay because the power of an infographic is in its visualizations, which is something that crosses languages and cultural boundaries. MVMS has a large English as a Second Language (ESL) population, which makes activities that require English proficiency very difficult for these students. The challenge in planning curriculum and activities occurs when we have a classroom full of students with a very broad range of English skills. SCIP required minimal writing from students, which enabled all students to participate in the project on an equal basis. The English proficient students could chose to write more if they wanted, and the ESL students could express their thoughts through bullet points and pictures. Figure 2 gives an example of an ESL student’s infographic, the amount of text is limited, but one can see they are able to convey their ideas effectively through graphs and pictures instead.

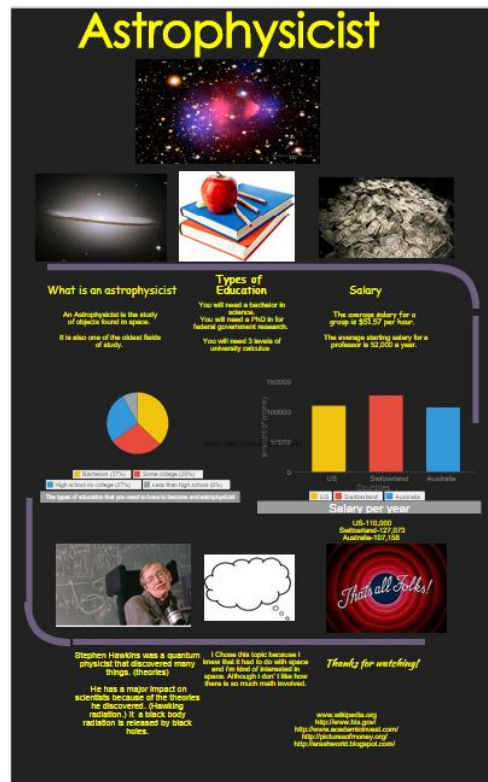


Figure 2. An example of an ELL student infographic.

3.3 Appeal to student interests

We found that SCIP appealed to the students in three ways: (1) many students were already interested in infographics and curious about how to make them, (2) some were able to research a career they were intrigued by more in-depth, and (3) some students fostered interest in the career they picked, despite having no knowledge of it beforehand.

As mentioned earlier, infographics have almost become a staple of online information delivery and the 8th grade students of MVMS were extremely aware of this new form of communication. They showed interest in the project from the start and were excited to

learn how infographics were made. In our opinion, using a medium the students were not only aware of, but quite familiar with, engaged them in a way few other communication mediums would have been able to. Their initial interest in infographics, and continued responsiveness to learn the material, created successful positive affect and made the adoption of the project quite successful.

The open-ended nature of the project appealed to many students, especially those who were already interested in STEM careers. The design of SCIP allowed for students to choose the depth of research they wanted to complete with their career. Some students took full advantage of this and used SCIP as a learning opportunity for how they could start on the path to obtaining a job in that area. Naturally, there were some students who were not as engrossed with their STEM career, so the design of SCIP let them spend time focusing on designing their infographic and less time on the research.

One of the most exciting outcomes SCIP produced was generating interest in STEM careers in students who were indifferent to them beforehand. Many of the students who became interested in STEM careers as SCIP went on acknowledged the creative aspect of the project as a driving force and change element. Figure 3. Infographic from student who became increasingly interested in their STEM career shows an example infographic from a student who fell into this category. The student was rather disinterested in the career at the beginning of the project. They begrudgingly researched their career, but it wasn't until they were required to find images and data for their graphs that they became more and more engrossed in the project. We credit visual nature of infographics for fostering this enthusiasm within the student, something that would have been unlikely to happen with a standard essay assignment.

3.4 More enjoyable than an essay

The final advantage we will talk about is something we have been alluding to throughout this paper: the students found that creating infographics was far more enjoyable than writing an essay. This result was caused by various reasons (creativity, limited writing, and encouraging interests), but the outcome was the same: the students *liked* the project. We had students approaching us during passing period and lunch, proclaiming how much they enjoyed the day's lesson or expressing how much they were looking forward to coming to class. Every day the students sat down in the classroom, they asked if we were going to work on SCIP, and they would be disappointed if we had another activity planned.

The students were proud of their work in this project. On presentation day, we had numerous students volunteering to show their infographic first, excited to show off their work. At the end of the project, we asked if the students liked the SCIP, the overwhelming response was that they enjoyed the project and wanted to do it again. These might be anecdotal examples; but we cannot overstate how integral student affect and enthusiasm is to the success of an exploratory project like SCIP.

4. COMMON PROBLEMS

Despite the success of SCIP, we also experienced many challenges and setbacks with the exploratory project which we will list here.

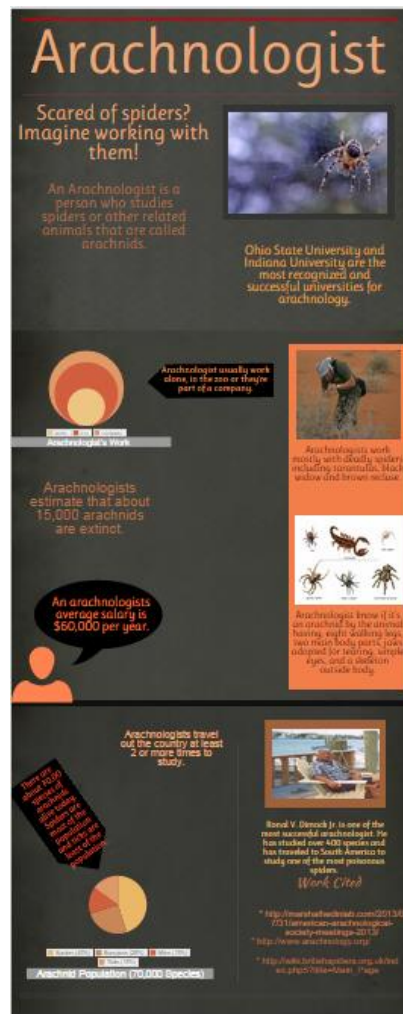


Figure 3. Infographic from student who became increasingly interested in their STEM career

4.1 Limits caused by free and online software

One of the major limits of SCIP was the software freely available to use. Since this was an exploratory project, we did not want to commit to purchasing pricy software in the first year. We were also limited by the computer labs available to the class. MVMS is fortunate enough to have multiple computer labs; however, the computers within these labs range from Macs to PCs to Chromebooks and we were not able to reserve a single lab for the entirety of the project. This combination of events forces us to use free, online software for the infographics. We suggested Piktochart.com, infogr.am, easel.ly, and Google Drawings to the students, while highly encouraging them to use Piktochart.com. We were pleasantly surprised by the tools and capabilities of each of these websites provided, but they also came with their own set of problems. The immediate problem we encountered was that each website required creating an account, so the students could save their work and return to it later. We told the students to create an account with their school email as the username and their school password as the password; however, despite best intentions, quite a number of the students forgot their email or password or misspelt either of these fields when creating their

account. This created problems on the second day when the students were required to log-in again and continue working on their infographics. Due to age and access to technology, many of the students at MVSM are not used to creating accounts online and remembering their login credentials. This was an oversight on our part, since we did not anticipate the volume of problems this step would create.

4.2 Noticeable learning curve for non-technologically savvy students

Many students had never used image or photo editing software before, so it took quite a bit of time for these students to learn how to use the software before they could start creating infographics. The SCIP lesson plan did not account for this problem, so a majority of Day 3 was spent getting the students up and running with the software. As the project went on, we noticed students having similar problems using the software; so give a short explanation, which would clarify a concept. Many students also had difficulty with tasks we thought they had experience with, such as downloading an image, taking a screenshot, or emailing their infographic as an attachment. We addressed these problems in a similar way, but all of these mini-lessons unfortunately detracted from the student's work time.

4.3 Persistence of the paragraph paradigm

The final problem we encountered was that some students created their infographics with paragraphs of text, instead of giving concise and direct statements. We attributed this problem to our continued comparison with the 5-paragraph essay. Some of the students took this analogy to mean they should still write the same amount of text, but give images and graphs to enhance their text. When we asked why they wrote so much text, the common reason was that they thought they would receive a lower grade if they wrote less. We deemed this logic the "paragraph paradigm". Throughout their academic careers, the students have been expected to deliver whole paragraphs when reporting about a subject. We tried to reintroduce a new tool for reporting, but the paragraph expectation still carried over. We concluded that we need to be more explicit about the amount and the type of text we are expecting in the infographics, and emphasize that the 5-paragraph comparison is only that, a comparison, we are not expecting an essay within the infographic itself.

5. CONCLUSION

Overall SCIP was deemed a success by both of the instructors. We received positive feedback from the students, they enjoyed creating the infographics and had fun throughout the project. We will be continuing this project next year, in the spring of 2015. We plan on updating the lesson plan to accommodate and adjust for the problems we saw during the exploratory phase.

6. ACKNOWLEDGMENTS

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