

# What They Learned: Using Multimedia to Engage Undergraduates in Research

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Published online: 28 July 2013

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**Abstract** Today's employers seek high levels of creativity, communication, and critical thinking, which are considered essential skills in the workplace. Engaging undergraduate students in critical thinking is especially challenging in introductory courses. The advent of YouTube, inexpensive video cameras, and easy-to-use video editors provides opportunities to increase students' skill levels in these areas. In this article I explain the assignment of producing a public service announcement that integrates research, collaborative learning, and creativity into an introductory survey course; and I discuss the support necessary for students' success. Their products demonstrate increased levels of media literacy, creativity, and critical thinking skills.

**Keywords** Critical thinking · collaborative learning · media literacy

Encouraging higher order thinking in undergraduate students is an essential goal of higher education, but it is also an ongoing challenge for instructors. Students often struggle with reading comprehension of scholarly articles, particularly when evaluating research and applying concepts to a larger set of ideas (Monge & Frisicaro-Pawlowski, 2013). Effectively synthesizing information is essential for classroom success and is often considered an essential component for employees in many workplace environments (Zohar, Degani, & Vaaknin, 2001). With the advent of social media technologies, such as YouTube, and the availability of small inexpensive video cameras with easy-to-use video editors, I have found that multimedia assignments provide important opportunities to engage students while promoting higher levels of critical thinking. Multimedia assignments encourage students to exercise higher order critical thinking skills by working in small, self-selected groups to create multi-media messages based on evidence collected and analyzed

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from current research (Anderson, Krathwohl, & Bloom, 2001; Bloom, 1956; Jones, 2006; Levine et al., 2008; Sims, 2006). This article explains how incorporating multimedia assignments can stimulate critical thinking and engage students in research through a collaborative learning project in introductory college courses.

## Literature Review

A report on work readiness indicates that the majority of employers (73%) finds applicants underprepared and lacking the skills necessary to accomplish work related tasks (Casner-Lotto, 2006). This study also reported that employers rate certain specific abilities as very important for employee success including critical thinking, oral communication, written communication, working in teams, knowledge about information technology, creativity, and innovation. The study showed that only a quarter of recent college graduates demonstrates high aptitude in these applied skills (Casner-Lotto, 2006). The additional proficiencies employers seek include effective interpersonal relations, collaboration, media literacy, and creative problem solving (Casner-Lotto, 2006). The question for faculty members has been and remains how to prepare undergraduates for the workforce by providing opportunities to develop the skills necessary to succeed (Zohar, et al., 2001).

Certain skills such as critical thinking, problem solving, and creativity encompass both social and behavioral knowledge; and cognitive abilities underlie successful utilization of these applied skills (Casner-Lotto, 2006). Cognitive abilities have been identified in Bloom's taxonomy, which is often used in colleges to structure assignments, as the process of cognitive learning – analysis, synthesis, and evaluation of information (Anderson, et al., 2001; Bloom, 1956; Shulman, 2002; Sims, 2006). Critical thinking is the ability to evaluate information for credibility and relevance and to apply it to create new knowledge within a disciplinary context (Kim, Sharma, Land, & Furlong, 2013; Monge & Friscaro-Pawlowski, 2013; Radeloff & Bergman, 2009). In the 21<sup>st</sup> century, advancing students' critical thinking skills can occur in a variety of ways, including using technology to promote interest and imagination (Ashley, Jarman, Varga-Atkins, & Hassan, 2012; Vedantham, Anu, & Marjorie, 2011).

Today's college students are more exposed to technology and media than any prior generation (Vedantham, et al., 2011). It is not surprising then that using media to engage students has been explored as a way to bring new expressions of thought into the classroom (Jusoh & Jusoff, 2009) and to bring history alive (Oliver, 2010). Media literacy, as a skill set, has grown beyond the simple and has come to encompass many different proficiencies such as the use of search engines to find information (Sperry, 2012), critical evaluation of information (Radeloff & Bergman, 2009; Sperry, 2012), and the integration of new information into a creative visual and/or verbal message (Monge & Friscaro-Pawlowski, 2013; Radeloff & Bergman, 2009). In other words, media literacy includes researching and accessing information, decoding media images, and creating new media based on acquired basic knowledge (Ashley, et al., 2012; Casner-Lotto, 2006; Monge & Friscaro-Pawlowski, 2013; Radeloff & Bergman, 2009). Media literacy provides an excellent opportunity to engage students so as to improve their critical thinking skills because many college students have broad exposure to and proficiency with various types of media technologies (Vedantham, et al., 2011).

Research has found that elevated student engagement results in improved learning outcomes and more positive college experiences (Evans, Hartman, & Anderson, 2013; Kuh, 2003; Zhao & Kuh, 2004). Critical thinking skills can be advanced through a variety of methods including active learning strategies (Carini, Kuh, & Klein, 2006) and through engagement with media technologies (Radeloff & Bergman, 2009). Active learning

strategies include collaborative learning, problem-based learning, service (experiential) learning, and involvement in research projects (Sims, 2006). Incorporation of these skills into college classroom activities and assignments provides opportunities for students to develop skills valued by both instructors and employers.

Currently, the ease of accessing, creating, and sharing multimedia content now makes it possible to develop engaging assignments that help students cultivate higher order thinking skills. (Sims, 2006). Professors and teachers have incorporated videos (Oliver, 2010), group work (Jones, 2006; Payne, Guastaferrro, & Mummert, 2011), multimedia assignments (Fredrick, 2008; Haines & Van Amburgh, 2010; Loveland & Harrison, 2006; Sewell, Denton, & Fink, 2011; Yamashita, 2005), problem-based assignments (Buxton, 2010), and specialized writing assignments (Pennock, 2011) with the goal of fostering innovative learning environments and advancing higher levels of thinking (i.e., analysis, evaluation, and creation). However, the research has focused narrowly on either the use of media in the classroom (Oliver, 2010; Vedantham, et al., 2011) or on video production related to such courses (Loveland & Harrison, 2006) rather than student production of the project from conception to final video.

Sims (2006) discussed four ways to create courses that facilitate learning by initiating student-centered classrooms through active learning strategies such as collaborative learning and research projects. The assignments are part of advanced coursework in juvenile law and justice courses, not lower level introductory courses at a large public university (Sims, 2006). Jones (2006) addressed ways to incorporate group work into introductory courses to extend learning and promote a creative learning environment for students. He described his use of small groups in an introductory criminal justice course that entails a research paper, with in-class activities, to reinforce group cohesion. He suggested that through these small group activities students are required to engage in higher order thinking skills including evaluation, synthesis, collaboration, and problem solving (Jones, 2006).

This article combines the research of Jones and Sims and extends their ideas further by incorporating a research component. I explain how students at a small branch campus of a public university engage in a self-selected group work assignment, in which they synthesize information and then create multimedia public service announcements reflecting what they have learned. The multimedia portion of the assignment provides an opportunity for students to develop and practice media literacy skills as well as synthesize research to construct a cohesive public message. The structure of the assignment includes comprehensive milestone deadlines supervised by the instructor, providing the necessary support for students to develop critical thinking skills (Kim, et al., 2013).

## The Study and Process

The purpose of this analysis was to examine how to integrate a multimedia assignment into an introductory college course in the context of a small, northeastern university campus; specifically my interest was in engaging students, promoting media literacy skills, and advancing critical thinking through a cooperative group approach. Prior to data collection, I had sought and received IRB approval for human subjects' research. The data derived from participants' final projects, evaluations, and reflection papers.

### The Context

Pennsylvania State University (PSU) encourages professors to include multimedia assignments in their courses by providing support through Media Commons, a University-wide initiative to

provide all students at its campuses with the tools and resources to produce quality digital media. In an effort to encourage multimedia assignments, Media Commons also supports faculty members in constructing assignments by providing prior case studies, examples of completed assignments, design guides, and assistance with implementing digital assignments in the classroom. The Public Service Announcement (PSA) assignment was designed for students in the “Introduction to Criminal Justice” course (CRIMJ 100) during the fall 2011 and 2012 semesters at New Kensington, one of the Commonwealth Campuses.

The New Kensington campus has approximately 800 enrolled full-time students of whom 90% are commuters. Only 10% of the students live in apartments near the campus. Currently, New Kensington offers 13 baccalaureate and associate degree programs and provides the first two years of introductory coursework for over 160 majors offered at the main University Park campus. New Kensington has 43 full-time faculty members and a student-professor ratio of 18-1, with an average class size of 24. The student body is approximately 39 % female and 61 % male, and it is approximately 88% Caucasian with 8% African-American students and only a small number of Hispanic and foreign students. The campus is located in rural western Pennsylvania and serves Penn State’s land grant mission to provide higher education to Pennsylvania residents.

### The Assignment and Process

The “Introduction to Criminal Justice” course provides an overview of the American criminal justice system, including components, crime, and its impact on victims and society as a whole. This course provides the foundation for many majors at PSU including criminology, administration of justice, and criminal justice; and it also fulfills a general education requirement in the social sciences for non-majors. The majority of additional coursework across several majors requires this introductory course as a prerequisite. Consequently, the course serves multiple functions, including encouraging students to take control of their education and make independent decisions, as a transition from high school to college work, and as a major foundation course and fulfilling part of the liberal arts education at PSU. As a result, the course attracts a range of students, both majors and non-majors and first semester students to seniors.

The assignment requires students to create a multimedia Public Service Announcement (PSA) that addresses societal problems relating to the field of criminal justice. To complete the assignment, students first conduct social science research, then focus on developing media literacy skills. While media literacy may not be required in many positions, these types of skills augment their electronic portfolio and increase their digital presence. For many students, a video engages them more than simply creating a script or other written material as described by some students in their reflection papers. At the end of the assignment, students write a reflective paper, examining what worked and what did not and considering how the process and final product might have been improved. The full assignment outlines the project, the intermediate steps, the outcomes, and the grading rubric. Students also receive a sheet with suggested potential topics to prompt a group discussion about their choices. Throughout this assignment, independent choice is encouraged, allowing students as much ownership of the process and the final product as possible, including choices regarding group membership, format, and topic. Since nearly half of the students are freshman, this assignment introduces both autonomous thinking (they are required to choose their own group members) and collective thought. The students begin working on the assignment during the first week of classes and continue until the end of the semester.

The introduction to the assignment includes an ice-breaking activity during the second class; students complete a social style inventory quiz developed by Merrill and Reid (1981). This quiz provides insight into one's interpersonal style, helping individuals to understand their own motivations, to promote harmonious working relationships, and to recognize how others are motivated so as to improve productivity (Merrill & Reid, 1981). The inventory identifies four distinct social styles: analytical, driver, amiable, and expressive (Merrill & Reid, 1981). Once students identify their style, they form groups according to their style and talk about the advantages and disadvantages of that particular style. They also discuss how to choose group members, including the advantages of diverse skills and the potential frustrations that may develop during this project. Additionally, I describe elements that lead to productive groups such as diversity, (i.e., not all freshmen, all women, all men, all majors, all non-majors) which expands resources and depth of knowledge and similarity in the degree of free time to work on the project because scheduling issues provide a major stumbling block for group work outside of classes. By the end of the first week of class, students are required to have chosen their own group members, up to five per group; and by the beginning of the second week of classes, the groups are required to have their first meeting with the instructor to discuss topics, schedules, and workload for the assignment.

To facilitate success, the project incorporates resources to support media literacy. A Media Commons consultant provides instruction on the available technology and services provided by PSU and the New Kensington campus, as well as information about copyright laws regarding digital media. Additionally, students receive feedback from the Media Commons consultant regarding technical issues in order to improve their Public Service Announcement rough drafts. A reference librarian provides in-class instruction on engaging in social science research and on the proper identification of peer reviewed primary research. Lastly, the assignment delineates intermediate deadlines, or progress markers, to facilitate group and individual meetings outside of class to complement the two in-class group work days throughout the course of the semester.

Over the course of the semester, six instructor/student group meetings outside of class focus on measurable, intermediate outcomes for each milestone, such as obtaining and understanding scholarly research, developing an outline, producing story boards and scripts, and completing a rough draft that Media Commons consultants review and critique. These deadlines and meetings allow the instructor to monitor each group's progress, including the individual work of each member. Attendance at the instructor-directed group meetings is mandatory, and students must bring project-related materials and answer questions about the project and the process. These meetings limit student procrastination and address conflicts that may arise among the group members during the process.

This assignment requires an additional time commitment for the instructor as well, specifically extended office hours. However, the review of student materials during these meetings may reduce overall grading time. I find it important to keep detailed notes on each group's progress; and at times the project requires more pointed direction than a typical class, particularly because groups may stall and require more direction and follow up appointments.

As the instructor, I also played another role: conflict mediator. To minimize the time lost due to group conflicts, this assignment also required my quick response to students' concerns. For example, in one group, a student began missing classes and meetings about a month into the assignment. After an exchange of emails, the student came to class and reported feeling uncomfortable in her group because one male member had made an inappropriate comment. We discussed the situation and explored various options, including a formal complaint through official routes. I also offered to facilitate a meeting to resolve the

issue. Eventually, group members resolved the conflict and completed the assignment as directed. Other students subsequently voted their final presentation the best in the class. In the end, professional conduct has become a center point in my discussions with groups from day one about their interactions not only with me, as their professor, but also with each other as collaborators.

The students present their Public Service Announcement (PSA) and research material to the class during the final week of the semester. During the presentations students introduce their project and explain the reason for choosing the topic. Most importantly, they elaborate on the evidence from scholarly literature by providing authors' theses, methodology, and results of the various studies used to support the information in their PSA. Presentations are approximately 10 minutes each. Many groups elect to use PowerPoint and handouts to help their audience understand the issues they are presenting. All group members must participate in the presentation. Lastly, the students complete an individual reflection paper detailing their role in the project, the group process, and the lessons they learned through the group project, thereby using reflective learning to advance problem solving and critical thinking skills for future projects.

## Results

Based on participants' final projects, their evaluations, and reflection papers, I identified the following themes relating to the multimedia assignment: increased critical thinking and challenges to successful completion.

### Products and Critical Thinking Skills

Over the two years that this assignment was implemented, 81 students created 20 different PSAs. Most groups developed projects selected from the list of approved topics, including child abuse, domestic violence, children of incarcerated parents, the death penalty, juvenile probation, the juvenile justice system, prison life, and sexual victimization. Some groups created related topics ranging from medical marijuana to aggressive driving and homelessness.

Some groups demonstrated creativity in melding social science research into multi-media formats. One group researching homelessness integrated photographs of homeless individuals (using proper copyrights) as the background to the presentation of statistics about the population. Their Public Service Announcement (PSA) synthesized five original research articles that included three policy studies and two ethnographic studies to address homelessness. To illustrate how effective the PSA was in connecting with other students in the class, the other students often referred to statistics gleaned from the group's PSA, for example, that three quarters of a million people are homeless in America and nearly half are families. The students who completed this particular PSA tied the issues of homelessness to the criminal justice system by examining criminal laws, such as vagrancy laws, that target individuals without homes.

The "children of incarcerated parents" group focused on population statistics and program results, which they interspersed with scenes of a single mother and a young son with a mentor at a park. They examined ten different studies exploring the effects of incarceration on attachment, childhood outcomes, and relationships. Their research also spanned different disciplines including psychology, criminology, public health, and family studies. In viewing the Public Service Announcement, the class expressed surprise about the millions of children with parents in prison, as well as their high dropout rates from school. As one student stated

on the peer evaluations, “I have never really thought about how incarceration had so much effect on children.” The group tied this issue to the criminal justice system and the nature of the sentencing.

The group focusing on medical marijuana took an innovative approach to the Public Service Announcement by integrating information from five different studies on marijuana use into a patient-physician conversation about pain management and medical management options, including marijuana and pharmaceutical prescriptions. In their PSA, they focused on the ability of doctors to provide marijuana as a medical treatment with fewer side effects than other pain medications such as Oxycodone or Vicodin. The other students were surprised to learn about the range of medical conditions treated by marijuana, although the visual quality of the PSA may have limited the impact of the presentation. This group demonstrated an excellent understanding of the subject matter, linking the topic, PSA, and presentation to broader course themes. The group examined the social construction of this type of crime, discussing its dynamic nature through relevant examples such as prohibition, current drug laws, and the consequences of criminalization. They also discussed the use of marijuana for medicinal purposes and contrasted its effects to legally prescribed medications manufactured by pharmaceutical companies. The presentation argued that marijuana may provide a better option for treating cancer and other diseases, yet the drug has been criminalized. Thus, they demonstrated critical thinking skills to connect dots between their research and our class discussions about the nature of law and crime.

The group focusing on the face of white collar crime developed narratives of individuals who commit such crimes. They synthesized three studies about white collar criminal activity to create stories to educate others about the motivations of white collar criminals and the effects of their crimes. Most students stated that they were surprised to learn that women are more likely to commit certain white collar crimes, such as fraud. Although the group had to use voice over technology because they had sound quality issues, the aid of the media commons consultant was useful in resolving this matter.

One group used a debate framework to explore issues surrounding capital punishment, specifically the use of the death penalty versus life without parole. They presented the issue concisely, relying on two individuals to outline the points and evidence regarding which punishment, death or life without parole, works best to stop crime in the most economical manner. Unlike other Public Service Announcements (PSA), they filmed exclusively in the media room on campus and based their presentation on research from two studies. The number of innocent people who have been exonerated while on death row surprised many students in the class, as mentioned on their peer review evaluations.

The remaining group projects, while fulfilling most of requirements of the assignment, demonstrated limited higher level critical thinking skills, with modest levels of creativity. These groups did not extensively research their issues; nor did they develop a strong understanding of the topics. Additionally, the videos were similar in format and quality, entailing a skit demonstrating some action representing the topic, followed by narration of facts and statistics regarding the prior scene.

Two groups whose projects fit this description examined issues related to violence. The first group presented a Public Service Announcement (PSA) on violent crime, examining violence in Allegheny County and followed the action to narrator pattern of prior PSAs. After an episode of violence between two men, the narrator reported on violent crime statistics in Allegheny County, including types of crime, racial makeup of victims and offenders, and recent trends in violence. The group based the PSA on two peer review articles in addition to official government crime statistics. While many of the students watching the presentation reside in Allegheny County, the high victimization rate of African-Americans startled them. The second group presented on the

topic of sexual victimization of college students, with a PSA involving a scenario in which two inebriated female college students leave a bar at night and walk through a dark area. The next scene has the young women found by other students in the morning on the ground with ripped clothing, implying that a sexual assault has occurred. The presentation provided statistics about rape on college campuses including risk factors and resources for victims. This group had a problem creating a cohesive PSA message due to an overlong presentation of the scene rather than presenting the information. The group relied on one peer review article but also reviewed the National College Women Victimization Study and a guide for women to protect themselves.

### Challenges

According to reflection papers and evaluations, students' concerns about the project fell into three categories: technical challenges, assignment defects, and group issues. While most of the groups had at least one member who was experienced in video production and technologically savvy, two groups were comprised entirely of freshman and reported that they lacked experience in editing digital media even though most are familiar with Youtube. These groups struggled with the technical task of editing and filming sequences. I dealt with these issues by referring students to technical assistance at the University Park campus via phone calls or the instructional design specialist on campus. Through these two resources, most technology issues were resolved. The campus technology supervisor was also used as a resource to ensure that other technical aspects of the presentation such as computers, cameras, and microphones functioned properly.

The majority of comments about what students found to be the most difficult element of the project focused on the group aspect. Students struggled with differing schedules, various commitment levels and personality conflicts. One student remarked that "having conflicts within the group was very stressful and interfered with getting the job done." Another student found that "[i]t was stressful at times trying to meet with the group to film and finalize everything that needed to get done." Yet another student became highly frustrated because "my group was very irresponsible, often skipping group meetings without warning."

I used a variety of methods to address these group issues including collecting anonymous feedback at each milestone meeting from all group members about individual involvement and making a portion of the grade reflective of professional conduct through the group process, requiring individual meetings with students who were not meeting standards (e.g. missing meetings, not contributing to the work or process, or promoting conflict among members), and suggesting ways to ease scheduling conflicts such as using Google documents and shared dropbox files for materials (McInerney, Michael, & Fink, 2003; Michaelsen, Knight, & Fink, 2004; Millis, 2009, 2010). Additionally, I utilized former students who were juniors and seniors and who had completed the project in prior years as volunteer group mentors. The group mentors attended the two in-class group work sessions and gave their contact information to the class. Group mentors reported that two groups did contact them for advice and aid. The paid tutor who had completed the course last year also provided further support for technical and group issues.

### Discussion

This assignment allows students to choose their own groups, topics, and even presentation style (e.g. video, narrated power point, etc), affording for substantial creative license which was appealing to and motivating for some students. As one remarked in his evaluation, "I



learned more than I ever thought I would about my topic.” The assignment had called for a two to three minute Public Service Announcement to educate the public on a societal issue related to criminal justice by presenting evidence from research. In the end, the students created twenty different PSAs in which they analyzed and synthesized research in order to tell evidence-based stories regarding a variety of topics, discussing relevant and timely social issues. Additionally, this project provided an opportunity to introduce underclassmen to collaborative learning through group work.

While the assignment in the first year required using a minimum of three primary peer reviewed articles, some groups used more than the minimum and created a more cohesive message. The top three videos—homelessness, medical marijuana, and children of incarcerated parents—cited five or more primary sources. These groups demonstrated a deeper understanding of their topic and developed a crafted message. As a result of these successes, the assignment evolved from the first to the second year to require five primary research sources. During the second year, the research component greatly increased across all of the groups; the result was a display of deeper understanding of the issues.

Additionally, the end products reflected different commitments to quality and professionalism amongst the groups. For example, while the medical marijuana group did not include any criminal justice majors, they still strived for a strong, professional product, drawing from complex research articles that provided the medical knowledge necessary to comprehend the implications of the issue they had chosen. This group’s experiences illustrate that a commitment to professionalism, rather than an intrinsic knowledge about a subject, can result in a high quality product. Throughout this assignment, I find that it is important to stress the concept of professionalism, not only because more effective projects resulted but also because of the importance of professional behavior that students need to develop in order to be successful in their future careers.

Additionally, the project has the potential to support students’ professional goals in that it can be included in e-portfolios and be of interest to potential employers. Electronic portfolios provide potential employers with digital examples of the students’ work. Students may also upload these materials to their LinkedIn profiles, providing instant access to their digital work. Some employers find this appealing because they can review a final product as an example of team work.

This assignment also provided the opportunity and structure for several meetings between students, the instructor, and student mentors throughout the semester, fostering better relationships and providing further mentorship for students. With the students’ permission, the PSAs have been highlighted on Penn State New Kensington’s website and on the program website as examples of our students’ work products (<http://nk.psu.edu/Admissions/44196.htm>). Examples may also be viewed on Youtube at AOJStudentVideos channel. Additionally, the Penn State Teaching and Learning with Technology symposium recorded a student panel discussing this assignment. The video is available at <http://www.ustream.tv/recorded/30021424>. It is hoped that this presentation will result in more students entering the major and becoming engaged in the higher education process; it also raises potential employers’ and community members’ awareness of the program. Lastly, the detailed assignment including grading rubrics, milestone expectations, and project outcomes is available on request by contacting the author.

## Limitations

This explanation augments other work on higher education efforts to examine how best to engage undergraduate students. However, there are some limitations worth mentioning. The first limitation is sampling. The sample for this study was from a single institution where the majority of the student body is traditional age, Caucasian-American college students (88%),

with significantly more males (61%) than females (39%), which is a different demographic from that of many other institutions. Consequently, it may not be generalizable to a more ethnically diverse student body. A second limitation is the availability of technology and assistance through University Park and at the New Kensington campus. While the campus is in a rural community with a primarily commuter population, the University does have the technology and technical assistance to help the students create their videos. Faculty members at institutions that lack such resources may have more challenges implementing this assignment or similar activities.

## Conclusion

These multimedia projects engaged many undergraduates in scholarly research and in the process, they developed critical thinking skills. The assignment demonstrates that engaging students with multimedia to develop and use critical thinking during an introductory course can occur successfully with the right assignment and appropriate support. Even though some students may have gained less than others, the models of others' projects may motivate and demonstrate the skills necessary to succeed. In the second year, the overall quality of the videos and the research improved. It is my hope that more students will improve and learn from their peers in the process as the assignment is repeated in the future.

In my opinion, the elements necessary for the assignment include deadlines to help students organize their time and activities so as to avoid procrastination and requiring extra attention from the professor. The time commitment for the assignment on my part shifted from grading papers in a solitary fashion to additional office hours and meetings with students. On balance, while I may have spent more hours in meetings than grading papers, the group meetings allowed me to learn more about my students and to facilitate their learning.

Furthermore, the autonomy given to the students through this assignment provides an introduction to college level work while providing a structure to complete the assignment for freshmen who need more guidance and an opportunity to develop an electronic portfolio for the employment search, especially for upperclassman. Many students found the group work challenging, and the reflection essay provided an opportunity to learn from their struggles. For example, some students disregarded the suggestions regarding diversity and differing schedules when choosing their group members. Additionally, the ability to choose their topic may have motivated some students to find out more about the subject and produce a better product, which leads to higher levels of thinking according to Bloom's taxonomy (Bloom, 1956). Therefore, I recommend this approach to others who are interested in integrating technology into their efforts to enhance critical thinking skills and engage students.

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