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Redesigning for Student Success: Cultivating Communities of Practice in a Higher Education Classroom

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Abstract: In this paper, I discuss the process of redesigning and teaching a mandatory, academic skill building course for students on academic probation at Mount Saint Vincent University (MSVU) in Atlantic Canada. The rationale for redesigning the course was to offer an alternative curricular framework, including instructional approaches, to course instructors who taught a modular-based curriculum. The original course was designed to focus on improving students' individual self-efficacy and motivation for academic success; however, the social and relational nature of learning was not articulated as an underpinning theory in the curriculum. In the new curriculum, I draw on both Etienne Wenger's (1998) notion of communities of practice as sites for learning and Howe and Strauss' (2000; 2007) work on generational analysis as theoretical frameworks. Furthermore, I incorporate Wenger, McDermott, and Snyder's (2002) design principles for cultivating communities of practice as a framework for translating theory into practice. The initial information that I collected from students, instructors, and a thorough review of the original curriculum led to the main inquiry question: How can a curriculum, centred on building community in the classroom, help students to cultivate meaningful learning experiences that take learning beyond a "fake it 'til you make it" mentality? This question guided the curricular design process and also my experiences teaching the course at MSVU during the Fall semester of 2012.

Keywords: course design, communities of practice, social learning, student success, millennial generation, higher education, teaching.

In recent decades, student retention and success has increasingly become a leading concern in universities in North America (Albert, 2010). Studies show that low student retention has many personal and financial repercussions for students and parents, potential loss of skills and knowledge for society, and both financial and reputational implications for higher education institutions (Yorke & Longden, 2004). The increase in services designed to promote and support overall student experience and academic success are indicators that institutions are seeking to mediate these risks. For example, many universities in North America adhere to four areas for supporting student retention: building awareness, accessibility services, academic supports, and transition services (Moxley, Najor-Durack, & Dumbrigue, 2013). Expanding counselling assistance and creating academic support programs, which include courses that students can take to build their academic skills and improve their Grade Point Averages (GPA), are examples of such services.

In this paper, I discuss the process of designing a course called, *Student Success: A Course for Personal and Academic Development*. This course was written as an alternative version of a course called the *Student Success Course* (SSC) – a mandatory, academic skill building course for

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students on academic probation – at Mount Saint Vincent University (MSVU), located in Atlantic Canada. I explain how the new curriculum was written using both Etienne Wenger's (1998) notion of communities of practice as sites for learning and Howe and Strauss' (2000; 2007) work on generational analysis as theoretical frameworks. Furthermore, I discuss how I incorporated Wenger, McDermott, and Snyder's (2002) principles for cultivating communities of practice as a curriculum design framework for translating theory into practice.

The aim of this paper is to provide higher education instructors and instructional designers with an example of a theory-informed curricular framework and suggestions for implementing such a design in practice. Throughout the paper, I draw on my own experiences of teaching the course in order to highlight pertinent aspects of how I enacted the curriculum in the classroom. I provide a starting point for instructors to consider conceptualizing a holistic framework for course design by designing for classroom *communities of practice* (Wenger, 1998) as contexts for cultivating transformative learning experiences with students. According to Wenger (2006), a community of practice exists when a group of people “engage in a process of collective learning in a shared domain of human endeavour... [and they] share a concern or a passion for something they do and learn how to do it better as they interact regularly” (para. 4). Secondly, the discussion in this paper is meant to act as an exemplar of a shift in the discourse on teaching and learning in higher education. More specifically, this shift is one that honours the emergent nature of both teaching and learning as a dialectal activity that can be supported when instructors cultivate communities of practice in higher education classrooms.

A Context for Redesign

The original SSC at MSVU was developed in 1999 by individuals working in Student Affairs as a retention effort aimed at supporting students who were at-risk of dismissal from the University. Typically, Student Affairs personnel and part-time instructors were hired to teach the SSC. In 2012, the average student enrollment at MSVU was about four thousand students. In addition, approximately one-hundred of these students were on academic probation and enrolled in the SSC for the first semester of their second year of university. At the time, the SSC had been divided into five sections with a cap of twenty students in each class. According to a study by Bowering and Merritt (2006), students who enrolled in this class shared a collection of similar characteristics. Students were on academic probation (they had a cumulative grade point average (GPA) less than 1.7 and greater than 1.0); they were under pressure to increase their GPA and had been experiencing a lot of stress; they were diverse in terms of cultural, socioeconomic backgrounds, upbringing, and learning histories; they were mostly in their second year of university and between the ages of 17 to 25; and, most students were typically enrolled in 2-3 other courses alongside of the SSC.

Rationale for Redesigning the SSC

The rationale for redesigning the SSC was to offer an alternative curricular framework, including instructional approaches, to SSC instructors for meeting the learning needs of their undergraduate students who were on academic probation. One of the primary aims of the course, in addition to academic skill building, was for students to develop a sense of responsibility for their own learning. With this goal in mind, the course was initially designed through a predominantly cognitive

perspective founded on theories of personal self-efficacy and motivation. Given this standpoint, each of the separate course modules were purposefully designed to focus on the individual student with the intention of improving their academic performance. While clearly evident and supported in the classroom environment, the social and relational nature of learning was not articulated in the theoretical underpinning of the original SSC curriculum. The need for this to be articulated as part of the curriculum seemed evident in order to maintain consistency in how and what was being taught but also to ensure the curriculum accurately reflected the social realities of the SSC learning environments.

From a curricular standpoint, the SSC was organized within a scientific curricular framework (see for example, Tyler, 1950). Within this framework, learning objectives, curricular content and resources can be easily predetermined and coherently organized. In addition, learning can be sequenced in a logical, step-by-step manner which can help students to grasp a clear understanding of the subject matter of their disciplines (Sowell, 2005). Many instructors find comfort in the systematic approaches to teaching and learning content that are espoused in such an approach to curriculum design. However, I was curious as to whether or not the linear instructional and learning processes that are predisposed within this curricular framework were conducive to helping students to claim ownership and discover intrinsic value in what they were learning (Wenger, McDermott, & Snyder, 2002) and potentially be transformed by their experiences. Research found that the instruction that students received in the SSC was effective in the short term in promoting academic success; however, long term effects of the course on students' learning and personal development have yet to be studied (Bowering & Merritt, 2006; Fancey, 2000). Ultimately, I recognized the potential for designing a curricular framework that supported open and safe contexts where students felt trust, respect, and freedom to explore ideas together (Cranton, 2002). In other words, a purpose for the new curriculum was to be more explicate in theory and in practice about showing how to support opportunities for students to be potentially transformed through their learning with others.

Collecting Information and Course Planning

Considering Stakeholders' Interests

From the initial planning stages of redesigning this course, I consulted the adult education literature on curriculum and program planning for adult learners. Specifically, I ascribed to Wilson and Cervero's (1996; 1997) argument that any stakeholders who may be affected by a program (or a course) should be involved in discussing what factors and features of the program content are important. As such, Wilson and Cervero (1997) describe program planning as a social activity in which planners negotiate personal and organizational interests to construct educational programs for adults. For example, I had conversations with students, instructors, and the course coordinator in order to gain their perspectives on the situational factors that influence course design. Some of these factors included the pressures of the accountability and retention paradigms at the university and the influence of the constraints of academic probation on students themselves. By engaging in conversations with each stakeholder group, I also gained insight into whose perspective and values had been used to determine the effectiveness, efficiency, relevance, and innovativeness of the original course and whose perspective and values may have been unknowingly disregarded. I used the information from each of these conversations as a form of gap analysis to support the course

design. Participants' words were represented in the common themes that I derived from conversations with them but individual quotes were not directly incorporated into the final curriculum document.

Information Collection

I collected information initially by speaking with all six course instructors and the course coordinator at the end of the first semester of the 2011-2012 academic year. I collaborated with these individuals in order to get a sense of the purpose of the sequence of course topics, to learn about the topics and instructional strategies by which students were most engaged, and to elicit their opinions on what areas of the course they felt needed improvement. Next, I visited four classes in December of 2011 that were following the original SSC curriculum. I engaged in conversations with students in the classes about the nature of the course and their experiences in the class. Table 1 outlines a series of questions that I used to gain an understanding both of students' perceptions of the SSC and of their learning experiences in the course.

Table 1. List of questions for students

| |
|---|
| 1. How do you want to learn? Tell me about whether you feel there are opportunities for you to learn this way, in university? |
| 2. Knowing that all professors have different ways of teaching, designing courses, and different views on student learning, how do you feel this affects you as a student? What are the implications for your learning in these situations? |
| 3. What does "success" mean to you? How did you learn that this is what success means? |
| 4. What definition of success do you feel is promoted at your university? |
| 5. Is there a difference between success in life and success in university? Please explain. |
| 6. How much input did you have on the course content? Did you feel there was room to change the course plan at all? |
| 7. Which topics did you find the most helpful to your learning and development as a student? |
| 8. Which course topics and content were most relevant to you? Please explain. |
| 9. Do you feel better prepared for your other university courses after finishing the student success course? Please explain. |

A number of strong themes emerged from conversations with students in the SSC. First, it was clear that students felt a positive rapport with the instructor. Many students indicated that the instructor established a bond with them through demonstrating care, understanding, flexibility, and by being available to them for individual consultations. Next, students commented on the sense of mutuality that developed in the group as the semester progressed. Numerous students attributed this to the fact that they got to know other individuals in the class who were in similar academic situations and, in some cases, comparable social and economic circumstances. Finally, students noted a direct connection between course content being relevant to their lives and their increased motivation for improving their academic and interpersonal skills. Some students' responses indicated that what they learned in the course had contributed to significant changes in their personal lives and academic success while, for other students, the course did not have such an effect. However, the modular, predominately cognitive-focus of the course curriculum did not

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reflect the kinds of transformations in attitude, behaviours, and beliefs that seemed to be articulated by students and their instructors. In the reality of the classroom, each of these transformations were supported through shared bonds, common understanding, and mutual support in the group. In considering the above themes within the framework of both theories that undergird this course, it was apparent that many of the learning experiences that these themes represent could be enhanced through cultivating communities of practice in the classroom.

Finally, I reviewed the original SSC curriculum document, the online supplemental content and the suggested instructional strategies. Specifically, I looked for key aspects of the content that could be retained in the new version of the course (e.g. particular course topics, activities, descriptions in the course syllabus) and language that could be changed to fit the new course design (e.g. changing “module 1” to “week 1”, or using phrases such as “students will have opportunities to . . .” instead of the more prescriptive “students will learn X”). The purpose at this stage was to improve the general flow of the curriculum by shifting the language used to describe teaching and learning processes in a way that honoured the emergent nature of communities of practice in the classroom.

To organize the above information, I created a planning matrix centered on the theoretical frameworks for the course – communities of practice (Wenger, 1998) and generational analysis theory (Howe & Strauss, 2000; 2007). In the matrix, I recorded information regarding the beneficial aspects of the original course, such as a particular course topic or instructional strategy, and considered ways of blending these with ideas I had for the new curriculum. Furthermore, the matrix allowed for easy identification of where the gaps were in language, content, instructional methods, and resources.

The combination of the above information prompted the following questions that guided the curriculum design process: 1) How is the current SSC curriculum conducive to helping students to find intrinsic value in what they are learning and, potentially, be transformed by their learning experiences? 2) How can a curriculum, centred on building community in the classroom, help students to cultivate meaningful learning experiences that take learning beyond a “fake it ‘til you make it” mentality? This last question was especially pertinent to the redesign process given that the SSC was (and still is) a pass/fail course where student achievement is heavily contingent upon attendance and completion of assignments.

Opportunities versus Prescriptions for Learning

Wenger (1998) argues that, in a community of practice, learning emerges from the interactions people have during the pursuit of a joint practice and as they negotiate the meaningfulness of what they are doing. The main purpose of cultivating a class community of practice is to bring about the class community’s own internal direction, character, and energy. To try to predetermine too many learning outcomes or how learning will emerge and evolve would be contradictory to this approach. In planning the new course, I purposefully changed the language to describe learning from prescribing what students *will* learn to what *opportunities* students will have to learn. Table 2 outlines the learning opportunities that students had the chance to experience in the course.

Table 2. Student learning opportunities

| |
|---|
| <i>Students will have opportunities to:</i> |
|---|

| |
|---|
| 1. Improve academic skills, acquire new skills and identify academic needs |
| 2. Connect with a community of learners and share ideas and resources to help each other learn |
| 3. Become self-regulated academic learners ² |
| 4. Use methods of critical reflection to examine assumptions, beliefs, and values about learning |
| 5. Think critically about personal learning histories and share experiences and stories related to learning |
| 6. Make informed academic decisions that realistically match goals and capabilities |
| 7. Develop and improve problem-solving and negotiation skills |
| 8. Increase confidence and uncover motivations for learning |
| 9. Examine psychological variables that impact academic progress |

Taken together, the above opportunities for learning augments systematic learning outcomes that prescribe what students will learn and are typically hard to predict because they are difficult to determine ahead of time. Part of the magic behind fostering communities of practice in the classroom is witnessing the various depths of learning that emerge from purposeful, social interactions and relationship building among class participants.

Theoretical Framework

The curriculum for this course was based on a combination of social learning theory, generational analysis theory, and design principles. I used Howe and Strauss' (2000; 2007) generational model to describe the characteristics of the Millennial Generation – the term that broadly categorizes students in the course. In addition, Wenger's (1998) *communities of practice* theory provided a basis for communicating how student learning can be both situational and relational in nature. Finally, Wenger, McDermott, and Snyder's (2002) seven principles for design for communities of practice framed the content of the curriculum—the weekly course topics, instructional methods, learning activities, assessment strategies, and additional resources.

Millennial Students

Over a number of years, Neil Howe and William Strauss have tracked, surveyed, and studied the Millennial Generation – the individuals born between 1982 and 2000 who now attend post-secondary institutions. The authors' publications, *Millennials Rising: The Next Great Generation* (2000), and *Millennials go to College* (2007) elaborate on the impact that this collegiate generation has had on higher education in terms of curriculum planning, teaching, recruitment and admissions strategies, campus life, and understanding of student learning. Howe and Strauss (2000; 2007) describe seven core traits of Millennial students as: special, sheltered, confident, team-oriented, conventional, pressured, and achieving. The authors suggest that Millennials have been perceived as special or unique from the time of birth; they are often sheltered and protected primarily by their parents in ways that previous generations were not; they adopt conventional/traditional

² Self-regulated academic learners are metcognitively, motivationally, and behaviourally active participants in their own learning; they are aware of when they possess a skill and when they do not; they recognize obstacles to their own learning and often find a way to succeed; and, often accept greater responsibility for their own academic achievement (Zimmerman, 1989).

perspectives; they feel more pressure to succeed in today's society than previous generations; they have an affinity toward teamwork as opposed to working individually; they are often considered as a "group" and thus, achievement is marked by their ability to keep pace with the group (hence their focus on achieving high grades); and, they are fueled by a sense of confidence and empowerment that surpasses many previous generations.

There is a growing body of literature in higher education that focuses on teaching Millennial students. This work suggests that instructors move away from only teaching through traditional lectures to using more instructional practices that incorporate the seven core traits (Dede, 2005; Howe & Strauss, 2007). For example, researchers suggested that undergraduate students today benefit from incorporating interactive technology, active learning, collaborative learning, content that is relevant to their lives, flexibility in grading, clarity of guidelines and expectations, frequent and immediate feedback on work and progress, and time on task (Dede, 2005; Howe & Strauss 2000; Oblinger, 2003; Skiba & Barton, 2006; Wilson, 2004). I incorporated some of these methods for working with Millennial students into the new course in an effort to include the seven traits outlined by Howe and Strauss (2000, 2007) and to help students to develop a sense of ownership and find value in what they were learning. For example, students had opportunities to engage in collaborative activities such as group presentations and team building exercises, use online blogs to disseminate their work and share resources, receive ongoing instructor and peer feedback, and offer input into class activities, content, and guest speakers.

Situated Learning in Communities of Practice

The course curriculum was also written with attention to Lave and Wenger's (1991) theory of *situated learning* within communities of practice. Communities of practice are typically "formed by people who engage in a process of collective learning in a shared domain of human endeavour... [and they] share a concern or a passion for something they do and learn how to do it better as they interact regularly" (Wenger, 2006, para. 4). Within a community of practice people also develop, negotiate, and share personal ways of understanding the world; they experience a form of social learning. Such social interaction forms the basis of a common bond that helps to establish a group identity and a sense of shared value to the learning that occurs within the group.

Central to situated learning is a process that Lave and Wenger (1991) refer to as legitimate peripheral participation, whereby individuals participate, to varying degrees, in a shared practice that is situated within their community of practice. In theory, an individual's goal in a community of practice is to move from the periphery of the community toward full participation. For instance, in this course, as students gradually gained confidence in their abilities and improved their academic and social skills, they became more comfortable and involved in learning activities. In some cases, certain students eventually assumed leadership roles in the class community of practice and acted as mentors to other students. Moreover, as the semester progressed, I witnessed an increase in student collaboration outside of class for study sessions, students checking in on one another on their blogs, and students making the effort to hold each other accountable for personal and group goals.

Participation within communities of practice is guided by reification—giving form to experience—of objects or concepts that concretely represent the practice (e.g. tools, symbols, stories, documents) and thus, the community of practice itself. For example, in the class, students developed tools and resources that helped them to develop and refine their academic skills.

Specifically, students created course blogs that they used to communicate with me and the other students in the class. Students posted written reflections, reactions to other students' blogs, and responses to conversations with various guest speakers that we invited to the class. Students' blogs were spaces unique to each individual; however, each blog was linked to the other class blogs. In this way, students' blogs acted as a visual representation of the shared identity that we cultivated in the class community of practice.

Three Key Elements of a Community of Practice

Wenger (1998) identifies three key elements for learning in a community of practice that give meaning to the processes of participation and reification. He notes that mutual engagement, joint enterprise (or domain), and a shared repertoire are the key determinants of communities as sites for learning. *Mutual engagement* is the established norms and collaborative relationships that members of a community of practice create through participation in the community; it is the emerging pattern of actions that occur as a group interacts regularly and for a particular purpose. The relationships that people cultivate are the ties that bind the members of the community together as a social entity. For instance, in this course, as students interacted with one another they began to value certain ways of doing things together and a group flow emerged. Wenger suggests that a predominant benefit of working collaboratively is that learners form a common bond centred on a shared understanding of the similarities that tie them together as a group (mutual engagement). This bond looks, feels, and is enacted differently in every group because group dynamics are uniquely configured depending upon the individual members and their personal learning histories. An additional advantage to community involvement for students can be that they generate a sense of ownership for their learning along with feelings of belonging and commitment to the group (Handley, Sturdy, Fincham, & Clark, 2006). Wenger (1998) adds that this sense of mutual engagement is an ideal context for the creation of knowledge. He explains that individuals can explore new ideas (even radical ideas) without feeling intimidated or embarrassed because "there is a strong bond of communal competence along with a deep respect for the particularity of experience" (p. 214). Secondly, as community members interact they form a shared understanding, or *joint enterprise*, of how they are connected together. This joint enterprise is constantly negotiated and re-negotiated by members throughout the life of the community and is sometimes referred to as the *domain* of the community. Students in the course had some similar key characteristics in their learning histories and current personal situations. For the most part, students established a group identity around a shared understanding of knowing what it is like to be in the situation they were in and also the shared desire to improve or change their personal and academic circumstances. Finally, as a result of the pursuit of joint enterprise over time, the community develops a *shared repertoire*, or set of common resources, as mentioned in the previous description of the reification process.

Cultivating a Community of Practice in the Classroom

In redesigning the SSC, I established the three key determinants for learning in a community of practice—mutual engagement, joint enterprise, and shared repertoire—by using a specific design framework. I used Wenger, McDermott, and Snyder's (2002) seven principles for supporting learning within communities of practice paired with Howe and Strauss' (2000; 2007) descriptions

of the characteristics of Millennial students. The curriculum was purposefully woven together with the following seven principles of design:

1. Design for Evolution.
2. Open dialogue between inside and outside perspectives.
3. Invite different levels of participation.
4. Develop both public and private community spaces to network and share information.
5. Focus on value.
6. Combine familiarity and excitement.
7. Create a rhythm for the community. (Wenger, McDermott, & Snyder, 2002)

Some of these principles were easy to implement in the beginning stages of curriculum design. For instance, I planned for students to create blogs in order to provide them with both public and private community spaces to network and share information and for people to interact outside of the classroom (principles 3 and 4). Students in the class interacted in these spaces at their leisure but their online activity also enabled a continuous development of a group identity outside of the classroom. I cultivated other principles throughout the course as the semester progressed and the class community of practice continued to evolve. For instance, I invited various guest speakers or “experts” to lead skill- building workshops on topics such as the fundamentals of academic writing and reading critically. The purpose of these activities was to invite outside participation and build networks with other communities of practice on a regular basis (principle 2). As the needs of the group emerged from week to week, we selected individual speakers to invite into the class and identified additional content and learning strategies that we thought would enhance learning (principles 1 and 5). Evidently, this also contributed to keeping the content fresh and relevant and added an element of excitement to the course (principle 6). Finally, in this particular class, the ongoing interplay between principles 1-6 allowed a group “rhythm” or flow to emerge (principle 7). It is important to note that the instructor plays a key role in maintaining the ebb and flow of the community through balancing the interplay of these seven principles and by paying close attention as the needs of the group change and continue to emerge.

Supporting a Community of Practice in the Classroom

“The most important factor in the community’s success is the vitality of its leadership” (Wenger, McDermott, & Snyder, 2002, p.80).

Cultivating communities of practice within higher education classrooms, requires an understanding and appreciation for the social, situated nature of learning (see Lave, 2009; Lave & Wenger, 1991; Wenger, 2009). This approach is embedded in the assumption that collective and individual learning occurs as people engage in a shared endeavour and interact with one another to learn in various ways. In a classroom community of practice, students and instructors reflect on, negotiate, and redesign aspects of the class according to the needs and interests that emerge from their personal experiences and shared histories. However, if learning is assumed to be emergent from individual and social processes in the classroom then it implies that instructional processes that provoke learning have to be somewhat organic as well.

While there is not a perfect formula for best practices or set of prescribed objectives for supporting emergent learning in a group context, there certainly are practices that work well. For

example, instructors can invite students to take part in class discussions and to direct the ebb and flow of conversation, they can offer students freedom and choice on class assignments, and they can set up structures that give students opportunities to engage in conversation with each other outside of class (through the use of technology such as email, blogs, and wikis). However, given that the dynamics, the individuals, and the physical environment of each class will differ considerably, instructors need to choose and/or develop suitable instructional practices on an individual, class-by-class basis. Stemming from the experience of redesigning and teaching this course, I suggest that instructors have to work on building “best insights” during and after every class that they teach. After all, learning about teaching is a process of discovery; it is one that involves learning from what is happening in real time, in the classroom, with students and their learning.

By supporting the evolution of communities of practice in the classroom, instructors can simultaneously create spaces for potential transformative learning. Significant scholarly work on teaching and learning in adult education and higher education stress some common characteristics of instructors who seek to support transformative learning. Some of these qualities include: modeling critical reflection; promoting experiential learning and collaboration; valuing learning histories (self and students); empowering students to question their assumptions, beliefs and values; inviting student input into course design; and, having a good understanding of group dynamics (see for example, Brookfield, 2006; Cranton, 2006; Mezirow & Taylor, 2009; Taylor, 2000). Ultimately, setting the stage for transformation requires an openness to the possibility that learning will likely emerge from a variety of interactions – student to student; student to instructor; and, student to curriculum content.

Conclusions

The implications for this course redesign reach beyond the local level of student retention efforts at MSVU and academic success courses themselves. Thinking about the various theoretical and design aspects involved in cultivating communities of practice with students can inspire instructors and instructional designers to consider how they frame curriculum in courses in higher education. Specifically, the theory and suggestions for curriculum design in this paper act as a guide for conceptualizing and cultivating contexts for learning that are: a) supportive of learning that is applicable and meaningful to students; b) conducive to helping students to discover their own intrinsic motivation for continuous, lifelong learning; and c) potentially transformative. According to Wenger (1998), to catalyze these learning processes, students need opportunities to participate in directing the internal direction of the course and to engage in learning both individually and as a group. Thus, the main goal of the redesigned course was to promote student-focused, participatory classes that left space for relevant content and opportunities for learning to emerge as students progressed through the course.

Much like what Wenger, McDermott, and Snyder (2002) suggest, I found that helping students to cultivate a sense of value as members of the class community contributed to their sense of ownership of their learning. In past work (Bogusz & Gauthier, 2012), I have theorized that this helps to promote a sense of lifelong learning, which, can sometimes be a struggle in courses that are graded simply as pass or fail. I purposefully redesigned the original SSC from the relational perspective that individuals learn with, through, and from others. In this spirit, when I developed

Student Success: A Course for Personal and Academic Development, I presented learning as a lifelong journey that is both individual and social and not simply a means to an end.

In the beginning of this paper, I pointed out that the rationale for redesigning the new curriculum for the SSC was to have the curriculum itself reflect the social, relational, and emergent nature of learning. This, I noted, was one of the limitations of the theoretical foundations of the original course curriculum. I situated the redesign process in theory from the literature and reported on putting theory into practice both in the curriculum design process and in my own classroom when I piloted the course. Moving forward, more research is needed to determine the effects and impact of the redesigned course over time and with various groups of students.

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Encouraging Civic Knowledge and Engagement: Exploring Current Events through a Psychological Lens

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Abstract: Engagement with political, social, and civil issues is a fundamental component of an educated population, but civic knowledge and engagement are decreasing among adolescents and young adults. A Psychology in Current Events class sought to increase this engagement and key skills such as critical thinking. A one-group pretest-posttest quasi-experimental design was used to assess changes in key measures after taking the class. The findings indicate that the students significantly increased their civic engagement, civic knowledge, multicultural sensitivity, applied thinking skills, as well as skills such as their ability to consider alternative viewpoints, appreciate diversity, monitor current events, and think critically.

Keywords: civic engagement, civic education, current events, critical thinking, psychology.

The ideal in a democratic society is that citizens are actively involved in their own governance and that such participation is based on an informed and critical reflection of political and civic issues (Branson & Quigley, 1998). Therefore, the success of such a system is built on a citizenship that is civically engaged and informed. Indeed, philosophers such as Jean Jacques Rousseau and Robert Maynard Hutchins have suggested that civic apathy may result in the death of democracy, or at least the moral and social decline of the state (Coley & Sum, 2012). Damon (2011) argues that the possibility of the country's future ending up in the hands of a citizenship that lack understanding of the benefits and duties of citizens is the most serious modern threat to America. In addition to acting as the foundation of a successful democracy and sustained future, civic engagement and knowledge impact on important civic attributes; for example, civic knowledge promotes democratic values, political participation, trust in public life/public figures, and can change attitudes on important social issues (Coley & Sum, 2012; Delli Carpini & Keeter, 1996; Galston, 2004). Other benefits of a civically engaged populous include the economic well-being of the society and the psychological well-being of its members (Coley & Sum, 2012). Finally, civic engagement and knowledge align with the attributes employers seek in graduates entering the workforce (Spiezio 2009).

Although it is widely accepted that civic engagement is important, and despite knowing what a civically engaged person “looks like” (Hatcher, 2011), the literature has not come to a consensus on how to define what it is exactly (Hatcher, 2010). Some definitions emphasize action, others knowledge, and others skills. One definition, adopted by the American Association of Colleges and Universities, for inclusion in their civic engagement rubric (AACU, 2009),

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emphasizes that civic engagement is multidimensional and includes knowledge, along with skills, values, and motivation. The knowledge component is perhaps the most disagreed upon component, and may be dependent on one's disciplinary perspective (Hatcher, 2011); for example, political scientists likely prize factual knowledge concerning the political process and institutions, whereas social workers are likely more focused on advocacy and justice (Hatcher, 2011). On the other hand, civic skills may cut across all disciplines. Following an extensive review of the literature from a variety of disciplines, Kirlin (2003) listed the categories of civic skills as organization, communication, collective decision-making, and critical thinking. Similarly, other researchers have identified skills commonly observed in active citizens, including taking the perspective of others, critical thinking, and dialogue with diverse peers (Daloz, Keen, Keen & Parks, 1996; Keen & Hall, 2008). Finally, a crucial component of civic engagement is likely civic identity (Colby & Damon, 1992; Daloz et al., 1996). The precise content of such an identity is somewhat intangible, but it likely includes critical thinking and empathy for others as well as a sense of civic agency and social relatedness (Hatcher, 2011; Kahne & Sporte, 2008).

Description of the Problem

Despite the obvious importance of civic engagement and knowledge, many reports express concern about the levels of both in the U.S. (Coley & Sum, 2012). In particular, adolescents' and young adults' knowledge of and engagement in the civic process are below desirable levels (Coley & Sum, 2012; Galston, 2001). This lack of knowledge is concerning to many because, as Supreme Court Justice Sandra Day O'Connor points out, "the habits of citizenship must be learned . . . But we have neglected civic education . . . and the results are predictably dismal" (Robelen, 2011). The link between civic engagement and knowledge on the one hand, and political participation on the other, means that one consequence of this disengagement is a widely documented decline in the political participation of young Americans. There has been a steady decline in voting participation in young adults between 18 and 29 between 1972 and 2014 with only 45% of young adults voting in the 2012 presidential election and only 21.5% voting in the 2014 midterm election ("Center for Information on Civic Learning", n.d.).

In addition to a general concern with engagement, knowledge, and participation, some scholars have placed particular emphasis on what has been termed the civic empowerment gap (Levinson, 2010) which describes an inequity among social groups in terms of their political participation and influence. More privileged groups typically have more political voice than other groups. Among those groups that are historically and currently underrepresented in the political process are those with low income and less education (Coley & Sum, 2012; Kahne & Sporte, 2008) as well as recent immigrants and those with limited English proficiency (Kahne & Sporte, 2008). This empowerment gap is reflected in the civic knowledge of traditionally oppressed groups. Black, Hispanic, and Native American students perform significantly lower than their White peers on assessments of civic education (U.S. Department of Education, 2010).

Civic Education

In response to the concerns regarding the civic engagement, knowledge, and participation of Americans generally, and young Americans in particular, there has been a call for an improved and revitalized system for civic education (Coley & Sum, 2012; Gibson & Levine, 2003). Civic engagement is multidimensional and includes knowledge, skills, and identity, all of which can be

encouraged with appropriate educational experiences. Even taking a narrower definition of engagement as a participatory action still allows for the notion that this action-oriented engagement likely starts with education. Civic education might best be described as the ways in which we prepare our young to undertake the role of citizens by providing them with the knowledge and skills necessary to participate in the democratic process (Patrick, 2004). Specifically, this refers to knowledge of civic life, the American political system, the role of citizens in the American democracy, and the relationship between the United States and other nations and general world affairs (Branson & Quigley, 1998). Further aims of civic education include encouraging people to become involved in the issues that affect them and more knowledgeable about the policies related to these issues, as well as to develop associated critical thinking and empathy skills (Hatcher, 2011).

Historically, educators have been responsible for producing citizens with the requisite knowledge, skills, and sense of responsibility to be civically engaged, indeed this educational aim was a primary reason for the establishment of public schooling (Chenneville, Toler & Gaskin-Butler, 2012). Civic education has generally been tackled at the elementary and secondary school levels. However, school-based civic education has been declining at both the elementary and secondary levels. Until the 1960s, American high schools typically offered three courses in civics and government. In contrast, most high schools now only offer one course in “American Government” offered in the 11th or 12th grade years (“Campaign for Civic Mission”, n.d.). This decline is in large part due to an increased focus on test scores in reading and math which has often come at the expense of social studies curricula (Center on Education Policy, 2006). The philosophical focus of traditional education that imparts facts in a value neutral setting (Fish, 2003), and a shift in focus to value practical career-based knowledge (Chenneville et al., 2012), may also share some responsibility for this decline. This reduction in civic education has unsurprisingly resulted in lower performance in civic assessments for high school students. The U.S. Department of Education (2010) reported that only 64% of 12th graders tested at or above the basic level in civic education in 2010 with only 4% of 12th graders performing at the advanced level. These scores represent a decline in 12th grader performance since 2006.

In an attempt to address the current civic knowledge deficits, and given the limitations of the elementary and secondary school systems, American colleges and universities may once again need to play a role in educating students on how to become active citizens. Of course the extent to which civic education is already prioritized varies widely across institutions. For some it is embedded in their campus mission, and embracing civic education would represent a return to a historic core value (Sullivan, 2000). In particular, increasing the political and civic engagement of less advantaged citizens should result in their concerns and needs receiving more attention (Verba, 2003) and therefore civic education initiatives might help to address the civic empowerment gap and so serve as a form of social justice.

Review of Relevant Literature

The concerns regarding civic engagement and participation, particularly among the youth, have spurred research examining the kinds of pedagogies that can successfully increase knowledge and engagement. Approaches to instructing specific knowledge is likely to be influenced by the discipline in which the civic education occurs (Hatcher, 2011); however, civic skills known to be related to civic engagement and participation (e.g., critical thinking, perspective taking) can be encouraged with generic pedagogies. For example, classroom experiences such as discussion,

reflection, social critique, and debate increase commitment to civic engagement (Chenneville, Toler, Gaskin-Butler, 2012; Hurtado, 2007; Keeter, Zukin, Andolina & Jenkins, 2002). These discussions are especially effective when they include current local and international events, diverse opinions, and an absence of judgment (Kahne & Sporte, 2008; Patrick, 2004).

Research suggests that an open classroom climate, with discussion and analysis of the issues, might be particularly important for minority students (Torney-Purta, Barber, & Wilkenfield, 2007; Youniss & Yates, 1997). Unfortunately, Kahne and Middaugh (2008) report that students of color and relatively low-income students typically receive less civic educational opportunities within the classroom. Kahne and Sporte (2008) found that for low-income students of color, classroom civic learning opportunities such as “learning about problems in society, learning about current events, studying issues about which one cares, experiencing an open climate for classroom discussions of social and political topics” (p. 746) were the strongest predictor of students’ commitment to civic participation and its impact was larger than any other factor, including prior commitment, extracurricular activities, and neighborhood and family civic engagement. Kahne & Sporte (2008) point out that their results seem to be inconsistent with previous work that suggests enrolling in civic education or government courses did not increase civic participation (see Cook, 1985, for a review) but argue that this suggests that it is not simply enrolling in a relevant class that will make the difference but rather ensuring that students engage in the kinds of activities found to be effective.

Purpose

A *Psychology in Current Events* class was designed to allow students to explore and discuss current events within society and seek to understand them using relevant psychological theories. Special emphasis was placed on introducing students to the laws of the United States relevant to the current events studied, and how they differ from other countries. The class was designed to incorporate the pedagogies known to increase students’ civic engagement. In many ways the broad goals of a psychology education are perfectly aligned with encouraging civic engagement. John Dewey—president of the American Psychological Association (APA) in 1899—argued that students need to struggle with social problems and consequently helped establish a progressive education pedagogy that is the basis for what we today call civic education or service learning (Chenneville, Toler & Gaskin-Butler, 2012).

Research Aims

This research aims to assess whether a psychology class incorporating pedagogies known to encourage skills related to civic engagement can significantly improve students’ civic knowledge and engagement as well as skills and attributes associated with civic engagement. Specifically, the research questions are as follows:

1. Will students demonstrate a higher degree of civic knowledge and engagement after taking the class? Specifically, it is hypothesized that the students will show a significant increase in a variety of measures of civic engagement and attributes related to such engagement, such as cultural sensitivity.
2. Can such a class significantly improve relevant academic skills known to be related to civic engagement, such as applied thinking skills? It is hypothesized that the pedagogies used in the class will result in a significant difference in a variety of related skills, including applied

thinking skills.

3. What impact will taking the class have on the knowledge and attitudes towards those topics covered in the class? We hypothesize that students will demonstrate increased knowledge of the legal issues surrounding the issues covered but make no hypothesis regarding any attitude change.

Method

Design

To assess whether students taking the class demonstrate any changes in civic knowledge and engagement, relevant academic skills, and students' knowledge and attitudes, we measured students on these components at the start of the class and then at the end, which allowed for an analysis of change. This one-group pretest-posttest (repeated measures) quasi-experimental design is common in classroom assessment research. Its strength lies in its ability to see change in the same group of participants as the result of some intervening event, in this case the class. This repeated measures approach uses participants as their own control which minimizes the impact of individual differences on the results and therefore reduces error variance. Consequently, this method is very sensitive to any effects and so statistically significant findings are possible with relatively small samples.

Participants

Participants were thirty-one female students enrolled in a *Psychology in Current Events* course at a small university in Washington, DC. Specifically, the students were from the College of Arts and Science which offers a liberal-arts undergraduate degree with a typical enrollment of approximately 1,000 students. The pre and posttests were given on the first and last day of class and so completion rates were dependent upon students' attendance. Thirty students completed the pre-test, twenty completed the post-test, and sixteen students were present for both classes and therefore completed both. The course was open to students at all levels. However, the majority of students were either juniors (n=15) or seniors (n=11). There were some sophomores (n=5) but no freshmen. On average, the students had taken 72 credit hours (approximately 24 classes) prior to the semester in which they enrolled in *Current Events*. Although not a prerequisite, all students had taken *Introductory Psychology*. In addition, all students had taken a critical reasoning class as well as foundational writing classes.

To adhere to institutional guidelines and to reassure participants of anonymity, demographic information was not collected. However, the students enrolled in the College of Arts and Sciences at the university are all-female, predominantly Black and Hispanic, and traditionally aged students (18-21). The course is a component of the general education curriculum open to any student. The majority of the students were psychology, human relations, and communication majors. However, other majors represented in the class included criminal justice, international affairs, business administration, mathematics, English, and biology.

Details of the Class

Psychology in Current Events is a 200 (mid-level) psychology class that explores current events using psychological theories and research. The covered topics in the class are revised each semester to ensure that they reflect the issues that are most relevant at the time. Topics covered in Fall 2013 when this assessment took place included immigration, healthcare reform, gay marriage, U.S. involvement overseas, religion in politics, jury decisions, and whistleblowing. The psychological theories presented each week depended on the topic being discussed. For example, immigration was explored from the perspective of social identity theory, acculturation, and realistic conflict theory; jury decisions examined group processes and flawed decision making as well as biases in memory.

The course was team taught by one clinical psychologist and one social psychologist, although both professors were present in all classes. Team teaching allowed the topics covered to be approached from a variety of psychological perspectives and therefore allowed the class to explore many of the nuances.

Requirements of the class included weekly readings presenting the issue from competing viewpoints, reading quizzes, debates (topic and side randomly assigned), and position papers that required students to take a stand on an issue relevant to the assigned class topic and use research, evidence, and proper argumentation to support their position. The first class period of each week was primarily instructor led and students were introduced to the topic and the relevant psychological theories and findings, though we were careful to foster an environment of open dialogue and discussion at all times. The second class period of each week was primarily student led. Students presented information in support of and in opposition to a controversial question relevant to the week's topic and then led a class discussion exploring the nuances of the issue. In all class sessions, the focus was on a careful consideration of the issues, open dialogue, careful reflection, and social critique evidencing critical thinking, all pedagogies known to increase commitment to civic engagement.

Procedure

Students completed a packet of measures designed to assess multiple dimensions relevant to civic engagement and knowledge on the first day of class and then again on the last day of class. These measures were designed to assess knowledge but also skills and attributes that the literature suggests are related to civic engagement, for example, critical thinking, appreciation of diversity, and empathy for others. Completion of these surveys was voluntary and there was no course credit for doing them. The surveys were anonymous and students created their own code that allowed pre and post-test surveys to be matched. The University's Institutional Review Board reviewed the project and deemed it exempt as it involves typical and ongoing assessment of student learning within the context of a class. Since the responses were anonymous and the project deemed exempt by the institution's IRB, informed consent was not necessary.

Materials

Civic Engagement. To assess students' level of civic engagement we used four questions from a poll used by Indiana University (Purdue) to assess their service learning courses, for example, "how much do you exercise your responsibility as a citizen". In addition, two questions were included that were based on the Association of American Colleges and Universities value rubric for civic engagement, for example, "how much do you feel able to connect knowledge from your

academic studies to civic engagement (participation in civic life, politics and government)". Students responded to these items along a 7-point scale from 1 (strongly disagree) to 7 (strongly agree). Students were also asked to rate the extent to which they are engaged with political issues, social issues, and current events using a 7-point scale from 1 (not at all) to 7 (very much). Internal consistency was good at pretest ($\alpha = 0.86$) and posttest ($\alpha = 0.80$).

Specific Class Aims. Twelve questions addressed additional aims of the class relevant to civic knowledge and engagement including considering alternative viewpoints, appreciating diversity, analyzing the role of citizens in the political process, monitoring and understanding current events, and thinking critically about political information. Students rated the extent they felt able to do each of these things from 1 (not at all) to 7 (very much). Internal consistency was high at pretest ($\alpha = 0.91$) and posttest ($\alpha = 0.94$).

Munroe Multicultural Attitude Scale Questionnaire (MASQUE). The MASQUE (Munroe, & Pearson, 2006) assesses multiple aspects of multicultural attitudes/sensitivity. The knowledge (know) subscale consists of seven items, for example "I understand that religious beliefs differ". The empathy (care) subscale consists of five items, for example "I am sensitive to language use other than English". Students responded to all items along a 6-point scale from 1 (strongly disagree) to 6 (strongly agree). Although internal consistency at pretest (know: $\alpha = 0.71$; care: $\alpha = 0.55$) and posttest (know: $\alpha = 0.60$; care: $\alpha = 0.55$) was modest, given the number of items and sample size could be considered adequate.

Applied Thinking Scales. This was originally designed as an exit interview to assess whether psychology majors acquired the core skills considered important for psychology majors (Peck, Stevenson, Skattebo, Wimer, & Love, 2013). We selected eleven questions to assess general applied thinking skills, for example, "when reading books or watching shows, I am likely to wonder about opposing points of view" and a further ten questions to assess those applied thinking skills attributable to psychology classes, for example, "because of my (psychology) classes I am more likely to consider both sides of an argument". Participants responded to all items along a 7-point scale from 1 (strongly disagree) to 7 (strongly agree). Internal consistency for both subscales was good at pretest (general: $\alpha = 0.79$; class specific $\alpha = 0.90$) and posttest (general: $\alpha = 0.85$; class specific $\alpha = 0.91$).

Skills. The class emphasized specific academic skills such as participating in discussions, making speeches to a group, using numerical data to make decisions, using information from a variety of courses to write a report, writing a paper representing a point of view, incorporating feedback when making revisions, and reconsidering one's point of view based on information gathered. Students rated the extent they felt able to do each of these effectively from 1 (not able to do effectively) to 5 (able to do effectively). Internal consistency was good at pretest ($\alpha = 0.85$) and posttest ($\alpha = 0.79$).

Confidence. The students also rated how confident they felt on a 7-point scale from 1 (not at all) to 7 (very) in regards to key skills emphasized in the class: critical thinking, constructing a written argument, constructing an oral argument, presenting evidence, and organizing a paper around a thesis. Internal consistency was good at pretest ($\alpha = 0.77$) and posttest ($\alpha = 0.90$).

Legal Knowledge. Students indicated how much they knew about the legal issues surrounding the topics covered in the class: immigration, drugs and alcohol, healthcare, gay marriage, gay parenting, religion in politics, and gun control. Students rated their knowledge for each topic from 1 (not very much) to 7 (very much). Internal consistency was high at pretest ($\alpha = 0.90$) and posttest ($\alpha = 0.94$).

Opinions. Students were also asked to rate their opinion on a 7-point scale from 1 (very against it) to 7 (very in favor) on the topics covered in the class: the DREAM act, the legal drinking age, healthcare reform (“ObamaCare”), gay marriage, adoption by gay couples, stricter gun control, and US involvement in other countries. Since each of these represent distinct issues, these items were not combined into a single scale but rather were analyzed separately.

Data Analysis

Cronbach’s alphas for all measures at both pre and posttest were calculated to ensure they had adequate internal reliability and could be used in further analysis. To compare students’ civic knowledge and engagement, related skills, knowledge and attitudes at the end of the class to these same attributes and skills at start of the class, a series of paired samples (correlated) t-tests were performed. In addition, as a measure of effect size, Cohen’s d was also calculated. Effect size is increasingly preferred to simple reporting of alpha and significance because it is considered more informative. While significance (alpha) values tell us whether something affects people, effect size tells us by how much it affects them. In other words effect sizes inform readers of “the magnitude or importance of a study’s findings” (APA, 2010). Effect sizes for Cohen’s d can be interpreted as small ($<.3$), medium ($0.4-0.8$) and large (>0.8) (Cohen, 1988).

Results

Our first research question asked whether students would demonstrate a higher degree of civic knowledge and engagement after taking the class. Students showed a significant increase in almost all measures of civic knowledge and engagement (see Table 1). While students rated themselves quite highly on civic engagement at pretest, they were significantly higher at posttest. Likewise, students’ responses to the items assessing the specific class aims such as considering alternative viewpoints, appreciating diversity, monitor and understand current events, and thinking critically were significantly higher at posttest. Although students rated themselves well above the midpoint on both the knowledge and caring aspects of multicultural attitudes/sensitivity at pretest, they were significantly higher for knowledge at posttest. Furthermore, the effect sizes for all significant findings were medium to large, suggesting that the class has an impact on these components of civic knowledge and engagement.

Our second research question was whether the class would significantly improve relevant academic skills known to be related to civic engagement. Students showed significant increases in a range of skills that were emphasized in the class that are pertinent to civic knowledge and engagement (see Table 1). General applied thinking skills were rated higher at posttest than pretest. Likewise those applied thinking skills attributable to psychology classes also showed a significant improvement from pretest to posttest. Students indicated that academic skills such as participating in discussion, arguing a point of view, and reconsidering one’s point of view based on information were significantly better after the class compared to the start of the semester. Likewise, students expressed a higher level of confidence in their skills such as critical thinking and forming/presenting an argument at the end of the semester compared to the start. Again all effect sizes were medium or large.

Table 1. Results of t-test and descriptive statistics for knowledge and skills

| | <i>Pretest</i> | <i>Posttest</i> | <i>Paired</i> |
|---------------------------------------|----------------|-----------------|-------------------------------------|
| | <i>M (SD)</i> | <i>M (SD)</i> | <i>t-test</i> |
| Civic Knowledge and Engagement | | | |
| Civic Engagement | 4.86 (1.00) | 5.52 (0.71) | $t(15) = -3.79, p < .01, d = 0.76$ |
| Specific Class Aims | 4.72 (1.05) | 5.38 (1.04) | $t(15) = -2.36, p = .03, d = 0.63$ |
| Multicultural Attitudes (knowledge) | 5.56 (0.42) | 5.79 (0.69) | $t(15) = -2.66, p = .02, d = 0.40$ |
| Multicultural Attitudes (caring) | 4.51 (0.87) | 4.73 (1.00) | $t(15) = -1.04, p = .32, d = 0.26$ |
| Relevant Skills | | | |
| Applied Thinking (General) | 4.74 (0.72) | 5.65 (0.78) | $t(15) = -6.07, p < .001, d = 1.21$ |
| Applied Thinking Skills (Psychology) | 5.49 (0.96) | 6.09 (0.81) | $t(15) = -2.64, p = .02, d = 0.68$ |
| Academic Skills | 3.66 (0.71) | 4.08 (0.63) | $t(15) = -2.49, p = .03, d = 0.63$ |
| Confidence | 5.23 (1.24) | 5.87 (0.84) | $t(15) = -2.17, p = .05, d = 0.60$ |
| Relevant Knowledge | | | |
| Knowledge of Issues Covered | 4.42 (1.31) | 5.57 (0.97) | $t(15) = -3.79, p < .01, d = 0.99$ |

Table 2. Results of t-test and descriptive statistics for attitudes towards specific issues covered in the class

| | <i>Pretest</i> | <i>Posttest</i> | <i>Paired</i> |
|-------------------------------------|----------------|-----------------|------------------------------------|
| | <i>M (SD)</i> | <i>M (SD)</i> | <i>t-test</i> |
| DREAM Act | 5.81 (1.42) | 6.63 (0.72) | $t(15) = -2.66, p = .02, d = 0.73$ |
| Lowering the US Drinking Age | 2.81 (1.94) | 4.34 (2.56) | $t(15) = -2.67, p = .02, d = 0.67$ |
| Adoption by Gay Couples | 5.75 (1.77) | 6.16 (1.63) | $t(15) = -2.28, p = .04, d = 0.57$ |
| Gay Marriage | 5.81 (1.80) | 5.94 (1.77) | $t(14) = -1.00, p = .33, d = 0.25$ |
| Healthcare Reform | 5.93 (1.44) | 6.20 (1.15) | $t(15) = -0.85, p = .41, d = 0.22$ |
| Stricter Gun Control | 5.75 (1.34) | 5.91 (1.34) | $t(15) = -0.34, p = .74, d = 0.08$ |
| U.S. Involvement in Other Countries | 3.38 (1.63) | 4.06 (2.23) | $t(15) = -1.10, p = .29, d = 0.28$ |

Finally, we asked whether taking the class would affect knowledge and attitudes towards those topics covered in the class. Students showed a significant increase in knowledge surrounding the key issues covered in the class at posttest compared to pretest and the effect sizes were large (see Table 1). In addition, although it was not an explicit aim of the class, students also evidenced a change in attitudes on some of the issues covered (see Table 2). Specifically, they were significantly more in favor of the DREAM act, lowering the US drinking age, and adoption by gay couples at posttest, compared to pretest. There was no significant change in their attitudes towards healthcare reform, gay marriage, gun control, or US involvement in other countries.

Discussion and Conclusion

A successful democracy depends on engaged citizens (Branson & Quigley, 1998), in part because civic engagement and knowledge result in civic participation. However, the level of both knowledge and engagement is lower than ideal and is declining (Coley & Sum, 2012). This is particularly the case for young Americans. A revitalized focus on civic education is one possible solution to this problem. As middle and high schools increasingly focus on reading and math skills the task of civic education may fall to higher education. In addition to an overall increase in civic engagement, education may also serve to level the playing field for young Americans whose homes and communities might not emphasize civic engagement, and therefore help to close what has been termed the civic empowerment gap (Levinson, 2010).

Many of the goals of a psychology class are well suited to the developing the skills needed for civic engagement (Chenneville, Toler, Gaskin-Butler, 2012; Hurtado, 2007). In addition, studying issues about which the students care has been shown to enhance civic learning opportunities (Kahne and Sporte, 2008). Therefore, a *Psychology in Current Events* class provided an ideal classroom setting in which to emphasize the knowledge, skills, and attributes important for a civically educated student. The pedagogical approach of the class was informed by literature which has assessed the efficacy of civic education courses, and consequently the class focused on social problems and engaging current events that were relevant to the students and critically explored them using open classroom discussion, debates, and critical reflection. Students gained experience critically examining issues, debating positions, and forming arguments.

Students showed a significant increase in their self-reported civic engagement. They also rated themselves as more able to consider alternative viewpoints, appreciate diversity, monitor and understand current events, and think critically. Students also reported improvement in other skills pertinent to civic knowledge and engagement, including applied thinking skills, participating in discussion, arguing a point of view, and reconsidering one's point of view based on information. Students reported a higher level of confidence in skills such as critical thinking and forming/presenting an argument. Finally, there was an increase in knowledge of those social issues explored in the class. This initial evidence suggests that a course offered by the psychology department focusing on current events provides an opportunity to engage students with political and civic issues and to develop the knowledge, skills, and attributes that allow them to be engaged and active citizens.

There are a number of limitations to the current assessment. First, it is of course important to note that the data presented is self-report and so future work should assess whether there is any actual change in students' skills and attributes. Second, and perhaps most crucially, future research should assess whether the changes reported here result in any sustained behavioral changes, for

example, higher levels of civic participation. In addition, there are some limitations inherent in a one-group design; despite the significant findings with medium to large effect sizes, without a control group, we cannot be sure the observed changes are due to the class and not some other unaccounted for factor. Future research replicating these findings using a non-equivalent control group design would strengthen confidence in the value of this kind of class. Further, this study relied upon a relatively small convenience sample with students who elected to take the course. As such, both sample size and self-selection issues may impact on the ability to generalize and replicate the key findings. Similarly, there was some attrition in our sample, only 53% of all enrolled students were present in both classes to complete the pre and posttests. The benefit of a paired samples t-test is that significant results are possible even with such a small sample available for final analysis, as was the case in our data. Furthermore, the effect sizes add confidence to these findings.

We have argued that a psychology class provided the ideal setting to encourage a change in students' civic engagement, and that we implemented it at an institution which serves a student body for which such change may be transformational. The characteristics of the University and the relationship between the students and the faculty may make this course especially effective in this setting. However, the course was designed to address the noted deficits in civic education and there is a need for all our young citizens to be more engaged and knowledgeable and so it is likely that this course could be widely adopted in many institutions with the same end. In addition, although we offer the course via the psychology department, it is certainly possible that it could be successfully implemented in other social science courses using the same curricular components presented here.

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Discrepancies between Student Perception and Achievement of Learning Outcomes in a Flipped Classroom

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Abstract: In a college algebra course that used flipped/inverted pedagogy, students achieved learning outcomes at a significantly higher rate, as evidenced by results on the final exam. At the same time, student perception on a number of measures decreased significantly, including how interested students were in the course and whether the instructor effectively facilitated learning. This article will draw on a variety of research to suggest reasons for these discrepancies and possible solutions to help improve student perception in learner-centered instruction.

Keywords: flipped learning, inverted learning, learner-centered instruction, pedagogy, mathematics, college algebra.

Introduction

The purpose of this article is to describe the results of using a flipped (or inverted) pedagogy in a college algebra course. The article will detail the results of several items on the student course evaluations that measure student perception and compare them with a traditional lecture course. It will also describe the results of the course with respect to student learning outcomes, as measured by the results of a final exam and compared with a traditional lecture course, and highlight the discrepancies between the student course evaluations and the final exam scores. Finally, it will draw on a variety of research to suggest reasons for these discrepancies and possible solutions to help improve student perception in flipped instruction specifically and learner-centered instruction generally.

This course took place at X University, a small, Catholic university that enrolls approximately 2,000 students. Among X University students' ACT math scores, the 25th percentile is 18 and the 75th percentile is 25. The students taking college algebra were typically not mathematics majors, but were taking it as a required course for their major.

Flipping the classroom typically indicates that the static content of the course is delivered outside of class, and class time is devoted to active learning experiences (Bergmann and Sams, 2012). In the case of mathematics courses, typically this means that the instructor delivers lectures via lecture videos that students watch at home, and class time is devoted to problem solving. This class is no exception. Flipped pedagogy is one of the ways to employ "learner-centered instruction" (Weimer, 2012).

Maryellen Weimer characterizes learner-centered instruction in the following way in her article "Five Characteristics of Learner-Centered Teaching" (2012):

1. Learner-centered teaching engages students in the hard, messy work of learning.
2. Learner-centered teaching includes explicit skill instruction.
3. Learner-centered teaching encourages students to reflect on what they are learning and how they are learning it.

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4. Learner-centered teaching motivates students by giving them some control over learning processes.
5. Learner-centered teaching encourages collaboration.

Learner-centered instruction is fundamentally different from traditional, lecture-based instruction. It is reasonable that student perception of learner-centered instruction differs from lecture-based instruction, but it is important to understand those differences.

Methodology

In order to assess student perception, the results of certain items on student course evaluations were compared for flipped and traditional courses. All of the course evaluations examined were taught by the same instructor. The flipped course evaluations all came from flipped college algebra courses. The control group came from college algebra as well as two other 100-level courses taught in a lecture-based style by the same instructor. The other courses were included because the number of students in the traditional college algebra course was prohibitively small (N=15). The response rate to the student course evaluations was high (at least 80% of the students who took the final exam completed the course evaluation).

This article will consider student responses to the following items:

- *“The instructor created an environment conducive to the learning process.”*
- *“The instructor encouraged my interest in the course.”*
- *“Overall, the instructor effectively facilitated my learning.”*
- *“Overall, I rate the course as excellent.”*

These were chosen because they are the most relevant items for assessing student perception of learning in the course.

For each of these items, students were asked to evaluate the statement on a scale of 1-5, where the responses indicated the following statements:

- 1: Strongly disagree
- 2: Disagree
- 3: Neither agree nor disagree
- 4: Agree
- 5: Strongly Agree

It is important to ask whether student perception, as measured by student course evaluations, is a helpful metric to consider. First, student perception of learning is typically considered to be reliable and valid. In a report entitled “Student Course Evaluations: Research, Models, and Trends” Pamela Gravestock and Emily Gregor-Greenleaf assert, “Several studies demonstrate that students are reliable and effective at evaluating ... the amount they have learned [and] the ease or difficulty of their learning experience in the course” (2008). This is not to say that students are reliable and accurate in assessing everything about a course—research suggests that students cannot effectively assess the content knowledge of the instructor, instructor bias, or methods of delivery, for example (Gravestock and Gregor-Greenleaf, 2008). Another review of the literature concerning student course evaluations also suggests that students can and do effectively rate their learning and the effectiveness of teaching behaviors in course evaluations (Gravestock, Greenleaf, and Boggs, 2008). Since the items considered here are among the types of items where student responses are widely held to be reliable and valid, it is reasonable to assume that they should be reliable and valid in this case as well.

Results related to student outcomes

Flipped pedagogy has been widely shown to be effective at increasing achievement of student learning outcomes (Bergmann and Sams, 2012; Khan, 2012; Berrett, 2012; Johnson, 2013; DesLauriers, Shelew, and Wieman, 2011; Van Sickle, 2015). Indeed, a recent meta-analysis of 225 studies that compare STEM classes taught with various pedagogical approaches. It indicated that student learning improved by 6% on average, as measured by examinations, and that students in lecture-based classes were 1.5 times more likely to fail than students in classes that used active learning strategies (Weiman, C.E., 2014; Freeman, Eddy, McDonough, Smith, Okorafor, Jordt, and Wenderoth, 2014). This college algebra course was no exception. When compared to those of a control group, students in the flipped classes performed significantly better on a final exam than students in traditional classes (Van Sickle, 2015). The results are detailed in the tables below.

Table 1. Final exam scores for all flipped sections

| | Flipped 1 (Fall 2013) | Flipped 2 (Fall 2013) | Flipped 3 (Spring 2014) | Flipped 4 (Spring 2014) |
|-------------------------------|--------------------------------------|--------------------------------------|--|--|
| <i>Mean</i> | 80.5 | 76.9 | 72.7 | 76.4 |
| <i>Standard Deviation</i> | 9.51 | 11.02 | 6.70 | 12.48 |
| <i>Number</i> | N=15 | N=17 | N=10 | N=10 |

Table 2. Final exam scores for all control sections

| | Control 1 (Spring 2011) | Control 2 (Fall 2011) | Control 3 (Spring 2012) | Control 4 (Fall 2012) | Control 5 (Spring 2013) | Control 6 (Fall 2014) |
|-------------------------------|--|----------------------------------|--|--------------------------------------|--|--------------------------------------|
| <i>Mean</i> | 71.6% | 72.2% | 66.3% | 83.6% | 63.3% | 69.9% |
| <i>Standard Deviation</i> | 17.67 | 19.06 | 20.26 | 10.89 | 19.72 | 19.51 |
| <i>Number</i> | N=5 | N=10 | N=7 | N=7 | N=10 | N=15 |

Table 3. Final exam scores for all flipped versus all control

| | All Flipped | All Control |
|-------------------------------|------------------------|------------------------|
| <i>Mean</i> | 77.2 | 70.5 |
| <i>Standard Deviation</i> | 10.80 | 19.43 |
| <i>Number</i> | N=58 | N=54 |

Using a one-tailed t-test to determine the statistical significance in all flipped and all control scores, the flipped classes' scores are significantly higher than those of the traditional classes, with $p = .0143$.

It is important to note that **Control 1-5** were taught by a different instructor than the flipped classes; however, the same instructor that taught the flipped classes taught **Control 6**, and the

results are strikingly similar to the average of the other control groups, as shown in the table below (Van Sickle, 2015).

Table 4. Final exam scores of control groups, by instructor

| | Instructor 1 (Control 1-5) | Instructor 2 (Control 6) |
|---------------------------|--------------------------------------|------------------------------------|
| Mean | 70.8 | 69.9 |
| Standard Deviation | 19.39 | 19.51 |
| Number | N=39 | N=15 |

Noting the dates of the courses, one can observe that after four semesters of using flipped pedagogy, the instructor decided to revert to a traditional lecture class. This may seem surprising given that students in the flipped classes were performing significantly better on the final exam than those in lecture classes. The change can be explained by the differences the instructor observed in student perception, as measured by student course evaluations.

Results related to student perception

After teaching four sections of college algebra using the flipped model, the instructor observed that the student course evaluations were less positive than her typical student course evaluations. At that point, the instructor had not taught college algebra using a traditional, lecture-based pedagogy at this university and wondered whether the differences in the final exam scores could be somewhat explained by differences between the instructors. Additionally, the instructor was discouraged by the less positive student course evaluations and decided to try teaching a lecture-based class. The lecture videos from the flipped class were made available to students, but not required, and the majority of class time was devoted to lectures, although some student activities were also incorporated. The tables below show the results on certain items in the student course evaluations.

Table 5. Results of “The instructor created an environment conducive to the learning process.”

| | Flipped | Traditional |
|---------------------------|----------------|--------------------|
| Mean | 4.12 | 4.38 |
| Standard Deviation | 0.993 | 0.642 |
| N | 43 | 34 |

In a one-tailed t-test, this difference was not statistically significant, with $p = .09$.

Table 6. Results of “The instructor encouraged my interest in the course.”

| | Flipped | Traditional |
|---------------------------|----------------|--------------------|
| Mean | 3.79 | 4.29 |
| Standard Deviation | 1.012 | 0.708 |
| N | 42 | 34 |

In a one-tailed t-test, this difference was statistically significant, with $p = .008$.

Table 7. Results of “Overall, the instructor effectively facilitated my learning.”

| | Flipped | Traditional |
|---------------------------|----------------|--------------------|
| Mean | 4.05 | 4.41 |
| Standard Deviation | 0.998 | 0.771 |
| N | 42 | 34 |

In a one-tailed t-test, this difference was statistically significant, with $p = .04$.

Table 8. Results of “Overall, I rate the course as excellent.”

| | Flipped | Traditional |
|---------------------------|----------------|--------------------|
| Mean | 3.95 | 4.34 |
| Standard Deviation | 1.056 | 0.736 |
| N | 43 | 32 |

In a one-tailed t-test, this difference was statistically significant, with $p = .04$.

It is difficult to reconcile the positive differences in the final exam scores and the negative differences in the student course evaluations, especially the following item: “Overall, the instructor effectively facilitated my learning.” Clearly, based on the final exam scores, the instructor more effectively facilitated student learning in the flipped classes, but according to the students’ perceptions, the opposite was true.

It is especially difficult to come to terms with this discrepancy because when it comes to their own learning, students are typically considered to be reliable and valid reporters on student course evaluations (Gravestock and Gregor-Greenleaf, 2008; Gravestock, Greenleaf, and Boggs, 2008). In this case, however, it is clear that they are not accurately evaluating their learning in the flipped versus traditional classes. While students in the traditional classes thought they learned more, the students in the flipped classes actually demonstrated increased achievement of student outcomes.

Possible explanations and solutions for the discrepancies in achievement of learning outcomes and student perception

1. “Engaging in the hard, messy work of learning”

One possible explanation for this difference is that students perceive learning based on how much they feel they are understanding in the class. During a traditional, lecture-based course, students are able to follow along with the instructor’s thinking, and they perceive that they are understanding. When they go home and attempt to work problems, they often have difficulty, but looking back at the class, they feel they understood because they understood the lectures. During a flipped class, the lecture videos are watched outside of class, and class time is devoted to working problems. Since working problems often causes students to have difficulty, they experience this difficulty in class. Looking back at the class, they remember the difficulty they had during class, and they do not feel they understood because they did not understand all of the problems.

Indeed, one of the criteria of learner-centered instruction is that it “engages students in the hard, messy work of learning” (Weimer, 2012). Since students are spending their class time

engaged in the “hard, messy work of learning,” they are more likely to recall that difficulty when it comes time to report their learning on course evaluations. Additionally, students may interpret learner-centered instructional strategies as “professional shortcomings of the professor as if the professor was ... not doing his/her job” (Bishop, Caston, King, 2014). Perhaps the most significant challenge of learner-centered instruction is convincing students of its importance (Doyle, 2008; Bishop, Caston, King, 2014). Honest dialogue with students about how they learn, why they take courses, and what type of instruction is valuable may help to ameliorate this problem.

2. First experience with learner-centered instruction

Another possible explanation for this discrepancy is that the experimental group only participated in a flipped course for one semester. For most students, it was their first experience with a non-lecture-based mathematics class. Indeed, for most students, it may have been their first experience with learner-centered instruction altogether. Substantial research suggests that learner-centered instruction in American high schools is uncommon (Doyle, 2008). Since course evaluations are comparative in nature, students may have had difficulty evaluating their learning in this course in particular.

It is also possible that over time and in taking subsequent mathematics courses, students may realize that they learned more than they thought, but since course evaluations take place at the end of the semester, they did not have this hindsight. Also, for this course in particular, it is the only required mathematics course for many of the enrolled students. As such, they may never take another mathematics course again.

3. Lack of preparation outside class

In lecture-style instruction, students who do not do their homework will likely do poorly on quizzes and tests, but when they come to the next lecture, they will still be able to follow along. On the other hand, in a flipped class, students who do not prepare by watching the lecture videos will likely struggle significantly throughout the class session. While there are a variety of ways to hold students accountable for watching lecture videos (Bergmann and Sams, 2012; Van Sickle, 2015), there will still be students who do not prepare. For those students, class will be more difficult, and the problems will be harder to understand. This may lead to students feeling worse about the class, and may reflect negatively in their course evaluations. Instructors must work to find the most effective methods for holding students accountable for their outside preparation. Of course, this will not guarantee that all students will come prepared, but it is of utmost importance to insure that as many students as possible do prepare.

4. Teacher-student interactions

Learning is not merely an interaction between a student and a curriculum—rather, teacher-student interactions are crucial and are an essential component of learning (Boaler, 2002). From observation, it seems that students who spend more time interacting with the instructor in a learner-centered course may have a more positive view of the course. Some students interact less with the teacher because they need help less often. These students may feel like they are teaching themselves. Other students may need help but do not want to ask for it. These students’ understandings will suffer because they will not be getting the help they need, and they may feel frustrated during class. Still others may get less attention from the teacher because of their position

in the classroom or other happenstance. For students who, by choice or by coincidence interact less with the instructor, there may be a more negative perception of learner-centered instruction.

This is one way in which lecture-based instruction is more equitable, especially for the purposes of studying student perception. In a lecture, all students have the same interaction with the instructor, so when it comes to student perception, it is reasonable to assume that course evaluations, for example, measure different students' perceptions of the same experience. In a learner-centered class, course evaluations are measuring students' perceptions of somewhat different experiences, even though those experiences took place in the same classroom.

In a learner-centered class, it is important to maximize teacher-student interaction, and to make sure those interactions are positive. One helpful framework for teacher-student interactions is by encouraging a growth mindset versus a fixed mindset, as put forth by Carol Dweck in *Mindset* (Dweck, 2006). Dweck's research suggests that students will put forth more effort when they are praised for their effort, rather than their inherent ability.

5. *Class culture—is it okay to be wrong?*

The final explanation for the discrepancy between student perception and student learning in the flipped class is that learner-centered instruction requires students to take risks that are not required of them in lecture-based instruction (Doyle, 2008). In learner-centered instruction, students have to give ideas that may be wrong, try things that are new and difficult, and possibly be wrong, all in front of their peers and their instructor. Some students are naturally more willing to be vulnerable than others, but for those students who find taking these risks difficult, this may dampen their perception of the course. Additionally, for those students who have taken risks, been wrong, and then been embarrassed, there may be a negative association with the course that affects their perception (Brown, 2012).

The instructor can help to establish a classroom culture where taking risks and being wrong is accepted by demonstrating a willingness to be vulnerable, as Brene Brown suggests in *Daring Greatly* (Brown, 2012). Although every class has its own unique chemistry, the teacher has an important role in cultivating a classroom culture where it is safe to take risks and be wrong. Brown has the following "Engaged Feedback Checklist:"

I know I'm ready to give feedback when:

I'm ready to sit next to you rather than across from you;

I'm willing to put the problem in front of us rather than between us (or sliding it toward you);

I'm ready to listen, ask questions, and accept that I may not fully understand the issue;

I want to acknowledge what you do well instead of picking apart your mistakes;

I recognize your strengths and how you can use them to address your challenges;

I can hold you accountable without shaming or blaming you;

I'm willing to own my part;

I can genuinely thank you for your efforts rather than criticize you for your failings;

I can talk about how resolving these challenges will lead to your growth and opportunity; and

I can model the vulnerability and openness that I expect to see from you. (Brown, 2012)

In learner-centered instruction, the challenge is that teachers are constantly giving feedback. Rather than feedback being something given once in a while during office hours, in learner-centered instruction much of each class period is spend giving feedback. Giving engaged

and effective feedback is difficult, but it is essential for creating the types of teacher-student interactions that are necessary for learner-centered instruction to be successful.

Student interest in the course

Another troubling item is “*The instructor encouraged my interest in the course.*” Flipped learning had the largest negative impact on this item, and this is concerning particularly because introductory-level courses like college algebra are often places where departments attract and retain new majors and minors (or fail to do so).

While some may argue that if learner-centered instruction is not encouraging interest in the course, it should not be done, it is important to remember that helping students succeed in course also helps to retain them in their major. Indeed, while there is a shortage of students graduating in STEM fields, there is not necessarily a shortage of students interested in STEM fields. The President’s Council of Advisors on Science and Technology (PCAST) issued a report that said, “PCAST found that economic forecasts point to a need for producing, over the next decade approximately 1 million more college graduates in STEM fields than expected under current assumptions. Fewer than 40% of students who enter college intending to major in a STEM field complete a STEM degree” (PCAST, 2012). Increasing retention of STEM majors, even modestly, could fill the gap. Additionally, getting students through required mathematics courses more successfully (and with better prerequisite knowledge to build on in future courses) is likely to help retain students in their STEM majors.

Still, that a flipped course encourages less student interest than a lecture-based course is important to consider, study further, and consider ways to ameliorate.

Questions for future research

It is evident that student perception in flipped pedagogy needs further study. In particular, as flipped learning becomes more common, it would be helpful to know whether students become better evaluators of their learning in a flipped class when it is not their first flipped class, or when they have experienced learner-centered instruction more often.

Another important question is whether certain groups are more effected than others. While this study is too small to consider sub-groups of students, a larger study could consider subsets of students to see whether students with certain characteristics evaluate flipped courses more highly than others.

Conclusion

No matter the explanation for the discrepancy between student course evaluations and achievement of student outcomes, it is clear that it exists. When comparing a lecture-based course to a flipped course, students did not accurately evaluate their learning in course evaluations. It is important for faculty and their supervisors to take this into account when considering course evaluations in learner-centered courses. Realizing that it is difficult to compare these course evaluations to those of lecture-based courses is an important first step. If faculty, department chairs, and those who make rank and tenure decisions understand that student perception is poorer for learner-centered instruction than it is for lecture-based instruction, they can bear it in mind, and faculty will not be penalized for it. As flipped learning specifically and learner-centered instruction generally become more common and better-studied, it is important to continue examining student perception and considering ways to improve it.

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A Theoretically Grounded Framework for Integrating the Scholarship of Teaching and Learning

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Abstract: SoTL scholars have written about the importance and utility of teaching from a guiding theoretical framework. In this paper, ecological theory and specifically Bronfenbrenner's bioecological model, is examined as a potential framework for synthesizing SoTL research findings to inform teaching and learning scholarship at the college level. A general overview of the bioecological model of human development and its application to the SoTL literature are provided. The benefit of adopting an ecologically-based framework to better understand and exploit the interdisciplinary nature of SoTL is discussed.

Keywords: ecological theory, bioecological model, college/university teaching, theory, SoTL.

Introduction

SoTL scholars have written about the importance and utility of working from a guiding theoretical framework when teaching and conducting research, yet a theoretically grounded framework for integrating scholarship on teaching and learning is absent from the SoTL literature (Felten, 2013). There is a need for a clear, systematic way of mapping out SoTL research that allows scholars to synthesize and assess SoTL literature related to their research questions and projects, identify gaps and limitations of prior work, and see how their work fits into the broader SoTL landscape. Utilizing an explicit theoretical framework to weave together studies from diverse disciplines allows for a more systematic and meaningful integration of findings from SoTL research. Moreover, an integrative heuristic tool, such as a theory-based framework, can provide a “big picture” view of interrelated studies and a deeper understanding of how research findings overlap and intersect across disciplines.

The scope of SoTL research is rather broad and diverse because of its interdisciplinary nature. As a result, it can be daunting to see how individual studies fit together particularly for scholars who are new to SoTL. Because SoTL is “happening” in so many areas of study, a theoretical framework that brings together seemingly disparate findings is needed. As Kern, Mettetal, Dixon, and Morgan (2015) noted, “...as SoTL has grown, the connections across the disciplines have blossomed, thus enriching the scholarship of integration. While some ways of knowing are unique to particular disciplines, there is much that is and will be shared across the disciplines” (p. 7). Although there has been a push for cross-disciplinary approaches to SoTL, Cassard and Sloboda (2014) pointed out that, “...not all disciplines speak in the same language”, which can present an inherent challenge when scholars from various disciplines attempt to collaborate on SoTL projects (p. 48). A theoretical framework that extends across disciplines provides a starting point for collaborative work such that scholars come together with at least some shared understanding. Theory provides a common language for teacher-scholars to benefit from the interdisciplinary nature of SoTL such that they might be more likely to investigate and apply “lessons learned” from other disciplines.

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An ecological approach to teaching and learning aligns with other “whole student” models of instruction in that it promotes inclusivity and student-centered approaches to instruction. Howie (2013), for example, discussed the application of Bronfenbrenner’s ecological theory to teaching young children and its utility in promoting inclusive educational environments through promoting school-family partnerships, and attending to shared and individual needs of students from all ‘ecological niches’. In this paper I propose Bronfenbrenner’s bioecological model as a theoretical framework for integrating research on teaching and learning in higher education. The bioecological model is appropriate for this use because of its developmental orientation and broad applicability. Student learning is the centerpiece of SoTL and learning is, after all, a developmental process. The bioecological model is studied in many disciplines and broad enough to capture proximal and distal influences on student learning, while attending to individual variation and student-environment interactions.

The proposed application of the bioecological model to frame SoTL research has the potential to highlight the interconnectedness of research from a variety of academic disciplines, promote cross-disciplinary conversations in SoTL, and bring clarity to “best practices” discovered in multiple academic disciplines. A general overview of the bioecological model is followed by an illustration of how the model could be used to identify studies and develop an educational workshop intended to promote excellence in teaching among new faculty. Many doctoral programs place heavy emphasis on research training and mastery of content knowledge, with less emphasis on how to teach and teaching pedagogy. As a result, new faculty might come to a university with limited teaching experience and training. Colleges and universities who provide additional training and mentoring to new faculty not only improve quality of instruction but also increase confidence and reduce feelings of isolation among new faculty (Savage, Karp, & Logue, 2004). A sample (but not an exhaustive review) of current studies is provided to demonstrate the utility of the bioecological model as a framework for synthesizing SoTL research, and specifically for the development of a teaching-oriented workshop for new faculty. The benefit of adopting an ecologically-based framework to better understand and exploit the interdisciplinary nature of SoTL is discussed.

Ecological Theory in a Nutshell

According to Bronfenbrenner (1979, 1988), human development is a process that occurs as a joint function of characteristics of the individual and environmental context. In his later work, Bronfenbrenner and Morris (1998, 2006) proposed a comprehensive bioecological model of development that involved four central components: Process, Person, Context, and Time. Central to the bioecological model are *proximal processes*, or the regular interactions that occur between the developing person and his/her environment (Bronfenbrenner & Ceci, 1994). Bronfenbrenner described proximal processes as the driving forces behind development and emphasized that such interactions needed to occur on a regular basis and become increasingly complex over time in order to promote development.

Person-environment interactions were theorized to vary as a function of individual characteristics (i.e., the Person dimension of the model). Person characteristics affect proximal processes and subsequent development by interacting with one’s environment in a number of ways. For example, genetically-based factors such as personality traits, sex, ethnicity, and physical attractiveness can elicit different responses from one’s environment. Those same characteristics may bring with them resources or deficiencies that place individuals in a position of social

advantage or disadvantage. Individuals, by virtue of their unique qualities, are attracted to different aspects of their social, psychological, physical, and symbolic environments. As individuals self-select into different environments, their knowledge and skills are uniquely shaped; similarly, as individuals become increasingly complex beings, they begin to actively structure or shape aspects of their environments in more complex ways.

Proximal processes are shaped directly and indirectly by various ecological systems (i.e., the Context dimension of the model). Individuals' immediate environments, or microsystems, include their families, workplaces, and academic institutions. The interaction of two or more microsystems, such as the overlap between school and home contexts, is called the mesosystem (Bronfenbrenner & Ceci, 1994). Exosystems involve indirect effects of the environment on development, such as the effect of parents' workplace on their children. The broadest and most distal context from the developing individual is the macrosystem, which includes the effects of culture on development.

Bronfenbrenner conceptualized time in a number of ways, from the moment-to-moment exchanges that take place between individuals and their environments (i.e., proximal processes) to events that occur over longer periods of time, including how person-environment interactions are shaped by the historical time in which they occur.

Taken together, the bioecological model is a framework for understanding human development that includes unique characteristics of individuals, the regular interactions they have with their environments, the contexts in which they are directly and indirectly situated, and time. The model integrates both proximal and distal influences on human development, taking into account how personal and contextual factors interact to produce varied results. In other words, this theoretical perspective considers the "whole person" situated in context.

The Bioecological Model as a Framework for Integrating SoTL Research

The bioecological model was originally proposed as a theoretical framework for empirical research on human development from an ecological perspective (Bronfenbrenner & Morris, 1998, 2006). Scholars across various academic disciplines continue to use parts of Bronfenbrenner's theoretical work to frame their research questions and methodologies. For example, ecological theory has been used to frame research questions that examine factors associated with academic success (e.g., Stewart, 2006). In addition, ecological systems theory and the bioecological model are taught to undergraduate and graduate students in many academic programs. Because scholars from a variety of disciplines are likely familiar with an ecological approach, broadly speaking, the bioecological model can be a user-friendly tool for synthesizing SoTL literature and provides some "common language" for collaborative work in the scholarship of teaching and learning. The bioecological model is a useful framework for integrating SoTL research studies as it calls attention to multiple influences on teaching and learning.

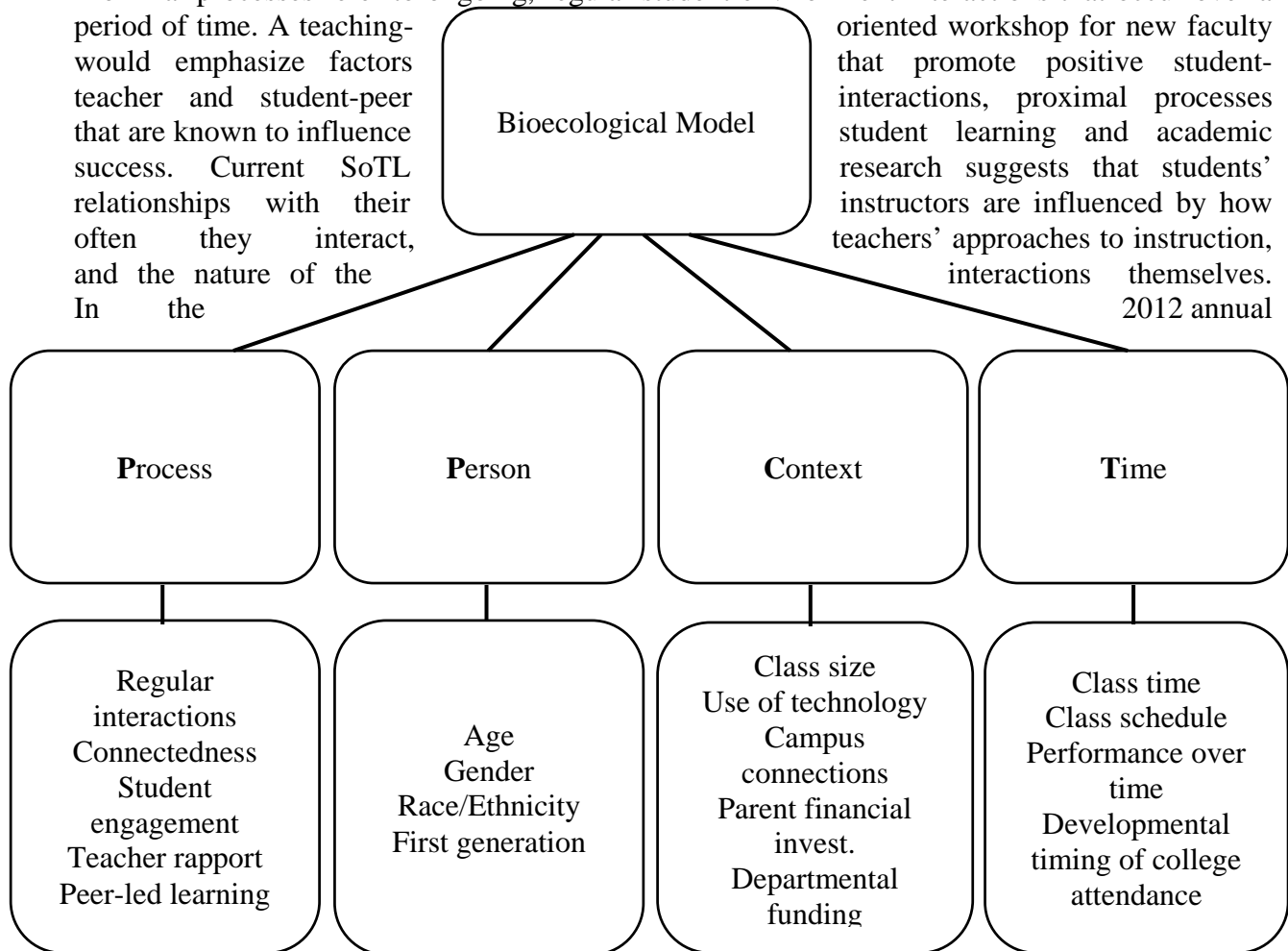
The bioecological model is proposed as a general framework for integrating SoTL findings in a meaningful and theoretically relevant way. This contextual and cross-disciplinary framework can be used to provide a cohesive look at students' personal and collective educational experiences, with a consideration for the broader contexts that may have a bearing on student learning (directly or in conjunction with other factors) over time. Figure 1 provides a visual depiction of the bioecological model and its four components (Process, Person, Context, and Time). Below each component I've listed variables that are identified in current SoTL research as relevant to student learning and could be included in a workshop geared meant to foster excellence in teaching among new faculty.

Figure 1. A visual depiction of the Bioecological Model used as a framework for organizing SoTL topics relevant to excellence in teaching.

The Process Dimension

Proximal processes refer to ongoing, regular student-environment interactions that occur over a period of time. A teaching-would emphasize factors teacher and student-peer that are known to influence success. Current SoTL relationships with their often they interact, and the nature of the In the

oriented workshop for new faculty that promote positive student-interactions, proximal processes student learning and academic research suggests that students' instructors are influenced by how teachers' approaches to instruction, interactions themselves. 2012 annual



report of the National Survey of Student Engagement (NSSE, 2013), regular student-teacher interactions were found to be valuable to student learning. Students feel more confident and

perform better in classes where they feel a connection to the professor (Micari & Pazos, 2012). Active and collaborative approaches encourage student-peer interactions and promote higher-order thinking and complex reasoning (Driscoll, 2000; Michel, Cater, & Varela, 2009). Student learning is enhanced when instructors promote small and large group discussions, and some studies suggest benefits of student-led group discussions over teacher-led discussions (Yoder & Hochevar, 2005).

University instructors who have been highly regarded for their teaching attend to and care about their students and the multiple factors that influence their learning (Jenkins & Speck, 2007). Christenbury (2011) contended that instructors are at their best when they are flexible, attending to the classroom context and students' needs, instead of operating from a rigid teaching plan. In a recent study of instructional effectiveness, graduate students identified the emotional context in which learning takes place as being as important as professors' content knowledge (Hill, 2014). The positive effects of teacher-student interactions on student learning are to some degree facilitated by the degree to which students are emotionally engaged in their coursework (Sagayadevan & Jeyaraj, 2012).

Informed by the literature, a teaching-oriented workshop could highlight ways in which faculty can be intentional about building rapport with their students through attentiveness, efforts to build trust, courtesy, and being relatable (Frisby & Myers, 2008). In addition, the workshop would emphasize the importance of regular student-teacher interactions and the value of active learning opportunities.

The Person Dimension

The Person dimension calls attention to individual sources of variability. In this example, a teaching-oriented workshop for new faculty would highlight student characteristics that are salient to their learning. Inclusive teaching practices that attend to individual sources of variability promote mutual respect within the classroom, increased awareness of diverse perspectives, and prepare students for a world that is indeed diverse (Bigatti et al., 2012; Wentzell, Richlin, & Cox, 2010). Therefore, instructors must be aware of student characteristics that are meaningful for their academic experiences such as their year of study (e.g., freshman, sophomore ...), age, gender, sexual orientation, family history (e.g., parents' educational attainment), ethnicity, religious background, English fluency/ literacy, exposure to diverse populations prior to college, and socioeconomic status, to name a few. A teaching-oriented workshop might prepare new faculty to work with specific subgroups of students such as millennials and first generation college students (McGlynn, 2008; Pascarella, Pierson, Wolniak, & Terenzini, 2004). In addition, new faculty would benefit from some guidance around adopting a multicultural approach to education, given its potential to increase cultural sensitivity among all students and reduce race-related stressors (e.g., racial stereotyping) among ethnic minority students (Bigatti et al., 2012; Harper, 2009).

The Context Dimension

Context refers to the environments in which learning takes place and that (directly or indirectly) impact classroom performance. The microsystem refers to students' immediate learning environments, which includes their classrooms and living spaces. Larger class size has been linked to poorer student and teacher performance, which suggests that teaching and learning challenges increase in proportion to the number of students in a given class (e.g., Bedard & Kuhn, 2008;

Chapman & Ludlow, 2010). Advances in modern technology have had a dramatic impact on the structure and setting of college classrooms. Studies of online learners suggest that they might need some additional accommodations in order to be successful such as technological help and sample assignments (Mupinga, Nora, & Yaw, 2006). On campus, students' use of smartphones during class time is a distraction and has the potential to compromise grades (Synnott, 2015). Challenges in on-campus and virtual classrooms further underscore the significance of the emotional tone set by the instructor and its potential to influence student learning. While instructors have limited authority over some aspects of the immediate environment in which they teach (e.g., the classroom location, classroom size, seating, and available technology), they do have some influence over the emotional and intellectual context of the classroom. Thus a teaching-oriented workshop for new faculty might include activities to strengthen instructors' ability to develop positive connections with their students, or proximal processes, as mentioned previously.

The mesosystem includes the interactions that take place between two microsystems (i.e., teacher-to-teacher communication that takes place on behalf of a student) and their influence on student learning. A recent review of 38 studies suggested that instructors collaborate with student support services on campus as one step in practicing inclusive education and improving the educational experiences of students with disabilities (Orr & Hammig, 2009). Disability services is just one example of a context that instructors might have to interact with on behalf of their students. Campus organizations, internship sites, and health services are other examples. Although newer faculty might know that these resources exist on campus, they might not know how or under what circumstances they should reach out to them.

The exosystem is a context that students are not directly situated, but has an indirect effect on their learning in the classroom nonetheless. Exosystem influences could also include environments not directly associated with the university setting. For example, Hamilton (2013) examined the effect of parents' financial contributions on students' academic success. Results from that study suggest that students who receive greater financial investment from their parents tend to receive lower grades, but are more likely to graduate than their peers. By acknowledging exosystem influences on students' performance in the classroom, teaching-oriented workshops promote greater sensitivity among new faculty.

The Macrosystem includes broader cultural forces, such as funding for academic programs and state and national priorities. Funding or lack of funding can impact course offerings, classroom size, access to technology, instructors' workload and their ability to effectively mentor students – all of which affect student learning outcomes (Hearn & Holdsworth, 2002). This too might be something new faculty know about, generally speaking, but with which they have little firsthand experience. As faculty gain experience and eventually tenure, they could find themselves serving on university committees and in leadership roles. Knowledge about macrosystem influences within an academic setting can assist instructors in making wise career-related decisions, being fiscally responsible, and navigating internal and external funding opportunities.

The Time Dimension

Time in Bronfenbrenner's theoretical work takes many forms. Human development and student learning are both fluid concepts that occur over time. In an academic setting we can consider the amount of time students spend in the classroom, how many days per week a class meets, the regularity with which teachers interact with individual students over time, or the time of day a class takes place. Some research suggests, for example, that optimal cognitive performance occurs

in the afternoon for college students (Allen, Grabbe, McCarthy, Bush, & Wallace, 2008). New instructors whose classes fall outside that time frame might want to encourage students to adopt specific strategies that enable them to stay awake and engaged during class. The timing of students' college experience in their own developmental trajectory matters as well. For example, the learning needs and level of confidence in the classroom may be different for traditional and nontraditional students (Bishop-Clark & Lynch, 1992). One study tracked students' academic goals, decision making, and self-evaluations across the first year of college, which might be useful information for new faculty in their mentoring/advising roles (Galotti & Clare, 2014). Teachers often track students' performance over time and many programs have accountability measures in place that examine cohorts of students in particular classes over time. We can also consider how our teaching takes place within a historical time. The "state of education" looks differently today than it did 30 years ago. Priorities change, funding mechanisms change along with shifts in the economy, opportunities for international students change with the political landscape, and the expectations of instructors change, for example. Thus, the time component of the bioecological model prompts a consideration for what has already happened, what is happening now, and the potential for changes in the future with respect to both teaching and learning.

Conclusion

The scholarship of teaching and learning has been gaining momentum over the past two decades. As SoTL gains more recognition and support at academic institutions, scholars are expanding and possibly redefining their research agendas to examine teaching and learning within their own disciplines. In this paper the bioecological model is proposed as a theoretical framework for integrating SoTL research findings and facilitating interdisciplinary collaborations among faculty. An ecological theoretical framework is appropriate for synthesizing SoTL research because it draws attention to the dynamic interplay between students' individual characteristics and their learning environments, and how multiple factors (both inside and outside of the classroom) are important to consider as instructors prepare for a productive academic year.

The example provided in this paper demonstrates the utility of this type of framework for the development of a teaching-oriented workshop for new faculty. There are virtually endless suggestions one could give new faculty about how to be an effective instructor. By situating current SoTL research within a bioecological framework, the vast studies about "how to teach well" and "what matters" suddenly become more digestible, user-friendly, and theoretically grounded. It is noteworthy that the studies collected for the example application came from SoTL, economics, psychology, and Black studies journals. I've provided just one example of how this framework could be implemented; the application is not limited to the development of a new program or workshop. Scholars interested in specific topics, such as the use of technology in the classroom, or specific outcomes such as academic self-esteem, could explore how extant research fits into each of the four components of the model. This works as a starting point for scholars embarking on topics that are new to them, or a way of examining familiar literature from a new point of view.

Of course there are other frameworks that may be a useful heuristic for pulling together SoTL research; this is just one suggestion that seems to work. Many instructors are already referencing Bronfenbrenner's work in their research and the classes they teach, and therefore this theory may provide teacher-scholars from a variety of academic backgrounds with a common ground for collaborative work. Additionally, this framework could be useful for teacher-student collaborations on SoTL projects particularly if students are exposed to Bronfenbrenner's

theorizing as part of their coursework. Because this is a developmental and contextual theory, it can be applied to understand studies of teaching and learning across multiple settings and disciplines. This framework could be particularly useful for budding scholars who are considering SoTL as a main line of research but might have limited familiarity with learning theories. The bioecological model can also be used to evaluate seasoned instructors who may be looking for a way to monitor and improve their teaching. Instructors could provide evidence of how they attend to Process, Person, Context, and Time dimensions when teaching their courses. Indeed, it is easy to fall into a rut of teaching within one's comfort zone. The bioecological model sensitizes instructors to proximal and distal influences on student learning and this model can accommodate the ever-changing contexts in which learning takes place.

The bioecological model provides a comprehensive and contextual framework for understanding student development and academic success and can be applied to virtually any discipline because it directs our attention to the *whole* student and the many factors that influence student learning. Beyond a heuristic tool for promoting collaborative SoTL research, the application of the bioecological model as a framework for integrating SoTL studies may also be useful for the development of a comprehensive teacher training program.

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Examining the Educational Benefits of and Attitudes toward Closed Captioning Among Undergraduate Students

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Abstract: Closed-captioning technology has been available for decades and is often used by individuals with disabilities to access video-based information. Videos are routinely used by educators in higher education settings throughout the United States. It is unknown, however, if closed captions are educationally beneficial for all students. The purpose of this study was to examine the educational benefits of closed captioning among college students without disabilities and their associated attitudes toward the technology. The use of closed captions adheres to the principles of Universal Design that encourage stakeholders to build environments and products that are accessible to all individuals. However, more evidence-based research is needed on the utility of this technology in college classrooms. Two separate video-based studies were conducted at one university, and groups were randomly assigned to “caption” or “no-caption” conditions. It was hypothesized that exposure to closed captions would increase students’ recall and understanding of video-based information and improve attitudes toward the technology. Results suggested that participants who were exposed to closed captions scored significantly higher on the subsequent assessment. Participants who already used closed captions in their daily lives had significantly more positive attitudes toward the technology. Recommendations for college-level educators and further study are provided.

Keywords: closed captioning, universal design, video-based learning

Closed-captioning technology has been available for use with television, film, and videos in the United States (U.S.) since the 1970’s (Taylor, 2005) and is often considered to be a reasonable accommodation for individuals with hearing impairments. When watching television, for example, closed-captions can be “turned on” to have a simultaneous visual text representation of what is being spoken on the screen. Typically, closed-captions will appear at the bottom of a viewing screen as one to three lines of white text on a black background. Closed-captioning is different from foreign language subtitles due to the inclusion of text that describes relevant non-speech sounds (e.g., falling rain, ominous music playing, dog barking) that sometimes take place off screen and are not visible to the viewer. The technology ensures that viewers with hearing impairments have a text representation of all relevant video-based information.

Research on the educational benefits of captioning began in the early 1980’s (Taylor,

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2005), and since that time has mostly focused on benefits for children learning to read (Linebarger, 2001), students with disabilities (e.g., learning disability, deafness) (Kirkland, Byrom, MacDougall, & Corcoran, 1995), or those who are learning English as a second language (Chen, 2012; Garza, 1991). Among these specialty populations, closed captioning has proven to be a useful tool when viewing educational videos. In contrast, there is a paucity of research on the educational benefits of closed-captioning among a general student population at various grade levels.

Studies that did include a general student population were conducted decades ago and showed inconsistent results. In one example, Ruggiero (1986) found no statistically significant differences in test performance or attitudes toward closed captions among two groups of undergraduate students without disabilities ($N = 80$). In contrast, Lee and Meyer (1994) found that closed-captioned video was the “most effective instructional media for learning retention with students ($n = 25$) who do not have reading deficits” (p. 445). Lee and Meyer supported closed-captioning use among college students without disabilities but recommended further study with larger sample sizes.

The only recent study the authors could find took a longitudinal approach and looked at student grade trends ($N = 340$) over a two-year period in a college course on Native American history in the U.S. (Collins, 2013). The researcher noted that, over the course of four semesters, students who were exposed to educational videos with closed-captioning, on average, performed better on assessments compared to students not exposed to closed-captioning. Collins also opined that students who were exposed to closed-captioning were more engaged, took better notes (as evaluated on assessments), and were more responsive to questions posed in class.

Despite its potential value, anecdotal evidence indicates that captions are seldom used in college classrooms. It is hypothesized that one barrier may be attitudinal. If closed-captioning is viewed as a benefit for individuals with disabilities, it is possible that this may affect its acceptance among individuals without disabilities. Attitudinal research on closed captioning has also been limited among a general population of undergraduate students and warrants further study. Students with disabilities (Kirkland *et al.*, 1995) or those learning a different language (Chung, 1996; Taylor, 2005; Weasenforth, 1994) have generally expressed a belief that the technology facilitates learning. In contrast, Ruggiero (1986) found no statistically significant differences in attitudes between two groups a (i.e., exposed to captions, no captions) of undergraduate students without disabilities. Sullivan and Jordan (2007) asked undergraduate students if closed captioning was an important and valuable service. Results indicated that students thought the technology was important for local news events but less important for entertainment style television such as sports programs and films. While Sullivan and Jordan did not explore attitudes toward closed captioning in an educational setting, they did point out attitudinal differences based on settings (e.g., news vs. entertainment). Therefore, the current study included attitudinal items that examined an expanded variety of settings where closed-captioning could be used.

The idea of utilizing closed captions in educational settings is aligned with the principles of Universal Design (UD), which states that environments or products should be designed to be accessible to as many people as possible, regardless of ability (Center for Universal Design, 2008). Due to an emphasis on access, UD is commonly associated with individuals with disabilities. For example, speech recognition technology is commonly used by the general population with smartphones to create and send text messages. However, this same technology has been used for decades to help individuals with fine motor skill impairments access personal computers using voice commands. Although UD originated in the field of architecture, the principles have been

tailored for school-based settings (Scott, McGuire, & Shaw, 2003) and efforts have been made to encourage postsecondary faculty members to utilize more inclusive teaching methods (Lombardi, Murray, & Dallas, 2013; Murray, Lombardi, Seel, & Gerdes, 2014) due to the perceived benefits for all learners. For example, instructors who share their lecture notes online with students or provide an audio version of readings materials would be exercising UD *Principle 1: Equitable use* and *Principle 4: Perceptible information*. In addition to perceived educational benefits, the use of UD in college classrooms potentially decreases the need for students to request academic accommodations based on disabilities or other learning needs. Building from the previous examples, students with disabilities would rely less on human note-takers as an accommodation or would not have to wait for accessible audio-based reading materials. Additionally, students that could benefit from these types of accommodations might not request them due to perceived negative societal attitudes. Although UD principles suggest educational benefits for all diverse learners (e.g., international students, student with disabilities), more evidence-based UD research in educational environments, particularly college settings, is needed to support recommendations for broader implementation (Schelly, Davies, & Spooner, 2011).

Previous research has challenged the use of UD teaching methods, specifically related to the use of closed-captioning. The “redundancy principle” (Clark, 2002; Clark, 2007) or “split-attention affect” (Moreno & Mayer, 2002) theorizes that multiple stimuli (i.e., audio, graphics, text) provided at the same time overloads students’ working memory and results in poorer outcomes on subsequent assessments. For example, Mayer and Moreno (1998) presented animated videos to students depicting how lightning forms and how brake systems work in vehicles. Students who saw the videos with audio narration only performed better on subsequent assessments compared to those who viewed the video with on-screen text. The researchers recommended only one visual stimuli for use with audio rather than two (i.e., graphics with on-screen text). Exceptions have been noted to the redundancy principle, however. Clark (2002) noted that individuals with poorer reading skills may benefit from multiple simultaneous stimuli (i.e., audio, graphics, text). Considering previous closed-captioning research findings, UD principles, and research on cognitive overload, it may be beneficial to examine the potential usefulness of closed-captioning for broader audiences more thoroughly.

In postsecondary institutions in the U.S., course-related videos are being shown more often than in the past (Burke, Snyder, & Rager, 2009; Moran, Seaman, & Tinti-Kane, 2011). This is most likely due to increased access to the Internet and classrooms that are equipped with computers, large screen projectors, and sound systems. The purpose of the current study was to examine the potential educational benefits of and attitudes towards closed-captioning technology among undergraduate students without disabilities. The authors were interested in adding to the knowledge base on this topic due to its potential impact on student learning. The following research questions were posed to help guide the study:

- 1) Does exposure to a video with closed captions influence performance on a subsequent assessment among undergraduate students?
- 2) Does exposure to a video with closed captions influence undergraduate students’ attitudes toward the technology?
- 3) What is the relationship between undergraduate student demographics and attitudes toward closed captioning?
- 4) What is the relationship between undergraduate student grade point averages, demographics, and performance on an information recall based assessment?

Based on guidelines associated with UD, the researchers hypothesized that students who are

exposed to a video with closed captions will perform better on a subsequent assessment based on the content of the video. Furthermore, it was hypothesized that students who are exposed to captions would report more positive attitudes toward the technology, compared to students who viewed a video without. Finally, the authors were interested in examining how student grade point averages and other demographic variables influenced participants' performance on the assessment and attitudes toward closed captioning.

Methods

Two studies were completed in Spring 2014 to examine the educational benefits of closed captioning and undergraduate student attitudes. The two-study design was used due to distinct differences in data collection methods. The researchers had an opportunity to recruit participants using two separate methods. Study 1 acted as a pilot study and took place in a computer lab using a computer-based assessment, while Study 2 took place in multiple classrooms using a paper-and-pen-based assessment. The researchers were interested in examining if results would vary dramatically or remain consistent when changing study environments (i.e., computer lab vs. actual classroom). The two-study design, versus one larger study, was also thought to increase the reliability of the results. Participants in both studies were undergraduate students enrolled at a research university located in the midwestern United States. Linear regression analyses were used to analyze the data. In addition to examining the relationship between closed captioning and assessment scores, the authors also examined student demographics.

Participants

Participants for Study 1 were recruited from the general population of undergraduate students at the university ($N = 206$). Study participants were predominately female (67.3%). Participants primarily identified as white (55.6%), followed by African American (15.1%), Hispanic (12.7%), Asian (6.3%), two or more races, (5.4%), Other (3.9%), Native Hawaiian or Other Pacific Islander (0.5%), and no response (0.5%).

Participants in Study 2 were enrolled in one of five introductory geology or geography courses ($N = 257$). The sample included 43.2% females. Participants identified as predominately white (67.7%), followed by African American (14.1%), two or more races, (7.7%), Hispanic (5.9%), Asian (2.7%), Other (1.4%), and American Indian/Alaskan Native (0.5%).

Based on institutional research, the total population of undergraduate students during the 2013-2014 academic year was 49.9% female, 60.2% white, 17.0% African American, 13.2% Hispanic, 4.9% Asian, 3.0% two or more races, and less than 1.0% American Indian/Alaskan Native or Native Hawaiian or Other Pacific Islander. Samples from Study 1 and Study 2 seem to closely resemble the total population of the university. Since previous closed-captioning research has already suggested benefits for students with disabilities or those learning the English language, the authors omitted participants who disclosed this information from the data analysis in both studies.

Materials

Materials for Study 1 and Study 2 included an educational video and a test packet that was created by the authors. The test packet was created using methods that were similar to previous studies involving captioning (Lee & Meyer, 1994; Garza, 1991; Ruggiero, 1986; Sullivan & Jordan, 2007; Taylor, 2005). The test packet consisted of short-answer, fill-in-the-blank, and multiple-choice items, as well as an attitudinal survey. Previous captioning research used similar items to measure understanding, information recall, and working memory. The 10-minute video used in the study discussed the issue of global warming (TED Talks, 2010) and could be shown with closed captions turned on or off. The test packet was created in consultation with experts in the field of assessment, geology, geography, and previous literature. All materials used in the study were subjected to pilot testing using undergraduate students.

Test packet. The test packet consisted of one short-answer item (i.e., *In complete sentences, please summarize the main ideas of the video.*) (score range 0-3), 12 fill-in-the-blank items (score range 0-12), and 16 multiple-choice items (score range 0-16); all related to information presented in the video. Test items were developed by the authors using a transcript of the video and in consultation with campus assessment experts and faculty in geology and geography disciplines. Based on Cronbach's alpha, the internal consistency for the fill-in-the-blank and multiple-choice items in Study 1 and Study 2 were 0.695 and 0.665 respectively, suggesting that the items had internal consistency. Scores on the short-answer, fill-in-the-blank, and multiple-choice items were combined to create a composite score (score range 0-31).

The short-answer item (i.e., *In complete sentences, please summarize the main ideas of the video.*), was scored by three trained graduate students. Using a rubric developed by the authors, evaluators independently reviewed each participant's answer and provided a rating of 0, 1, 2, or 3. A score of 3 indicated that participants had a working memory of the video content and detailed all the main ideas of the video. Agreement was obtained when two of the three evaluators provided an exact match. For Study 1 and Study 2, the inter-rater reliability among the three scorers of the short-answer responses was 0.84 and 0.87 respectively (Ebel, 1951). A second section measured participant attitudes toward the use of closed captioning and also included a demographic questionnaire. Attitudinal items were created by the authors using previous literature and in consultation with experts in deafness rehabilitation and instruction-based universal design.

The 15-item attitudinal section included statements such as "*Course-related videos that are viewed with closed-captioning support college student learning.*" or "*It is not important for closed-captioning to be available for live television news broadcasts.*" and were measured on a seven point Likert-type scale (i.e., *Strongly Disagree to Strongly Agree*) with a *Neutral* option included. One attitudinal item was negatively correlated with other attitudinal items in the survey and was omitted from further statistical analyses. Therefore, 14 attitudinal items were used to create an attitudinal composite score (score range 14-98). Higher scores on the survey indicated more positive attitudes toward the technology. For Study 1 and 2, Cronbach's alpha was .80 and .81 respectively, suggesting internal consistency among the 14 attitudinal items.

Items used for descriptive analyses were also included in the survey such as "*In your overall college experience, what percentage of your instructors have shown one or more videos in their courses?*" or "*What percentage of time were these course-related videos shown with closed captioning?*" The authors assume students are frequently exposed to course-related videos yet have less exposure to closed captioning. Demographic information was collected and served as additional variables for the regression analyses, for the descriptive analysis, or to omit certain participants from further analysis. Information included: year in school, college major, age, gender, race/ethnicity, grade point average, primary language, and disability status information.

Additionally, participants were asked the percentage of time they personally use closed captions (i.e., 1-25%, 26-50%, 51-75%, 76-100%), if they knew someone with a hearing loss (i.e., yes, no), and if they had previously viewed the video (i.e., yes, no).

Study 1

Sample and Recruitment

The researchers utilized an undergraduate e-mail listserv to recruit participants. Undergraduate students were e-mailed once during the Spring 2014 semester and asked to participate in a study on video-based learning. The e-mail included a link which students could use to schedule one of eight times to participate in the study based on their availability. The eight scheduled times used were then randomly assigned “closed-captioning” or “no closed-captioning” conditions by the authors. An e-mail reminder was sent to participants the day before their scheduled participation date. A \$10.00 incentive was also mentioned in the e-mail and was provided to participants who completed the entire study. The same classroom (i.e., a computer lab) was used for each of the eight data collection times and had a seating capacity of up to 50 participants.

Procedures

The authors greeted participants as they arrived at the classroom (i.e., computer lab). Once all participants were seated, the authors reviewed the informed consent form and gained participant signatures. Participants were informed that the study would examine how students learn using videos. Participants were then shown the video with the lights off. Captions were either turned on or off by the researchers, depending on the condition assigned. Immediately following the video, participants responded to an online “test packet.” Participants were given five minutes (per section) to complete the entire packet, which was deemed ample during pilot testing. Sections were presented to the participants in the following order to minimize visual cues related to the content of the video: a) short-answer; b) fill-in-the-blank; c) multiple-choice; and d) attitudes, demographics. Prior to exiting the classroom, participants were debriefed and informed of the closed-captioning focus of the study.

Results

Composite information recall score. A linear regression analysis was used to analyze the data for Study 1. Three participants were omitted from the study because they categorized their year in school as “post-baccalaureate.” Therefore, the total sample size for the statistical analysis was 203 participants.

Participant’s grade point average (GPA), was significantly related to the participant’s composite information recall score, $F(1, 196) = 13.59, p < .001, r = .25$. After controlling for the effect of GPA, there was also a significant effect of closed-captioning condition, $F(1, 196) = 5.61, p = .019, \eta_p^2 = .028$, gender, $F(1, 196) = 4.60, p = .033, \eta_p^2 = .023$, and undergraduate class, $F(3, 196) = 3.03, p = .031, \eta_p^2 = .031$. $R^2 = .147$, indicating that approximately 15% of the variance in composite information recall scores could be accounted for based on participant GPA, closed-captioning condition, gender, and undergraduate class. Table 1 provides a summary of the analysis.

| Source | SS | df | <i>F</i> | Significance | η_p^2 |
|----------------------|--------|-----|----------|--------------|------------|
| Captions/No Captions | 96.26 | 1 | 5.61 | .019* | .028 |
| Gender | 78.99 | 1 | 4.60 | .033* | .023 |
| Year In School | 156.02 | 3 | 3.03 | .031* | .031 |
| GPA | 233.32 | 1 | 13.59 | .000* | |
| Error | | 196 | | | |
| Total | | 203 | | | |

Table 1. Study 1 Analysis of Covariance (ANCOVA) Summary Table $R^2 = .147$ *Note.* Dependent Variable: Composite Information Recall Score*Note.* * indicates statistical significance at .05 alpha level

For parameter estimates, groups that had the largest number of participants were identified as the comparison group. Planned contrasts revealed that participants ($n = 92$) exposed to closed captions had significantly higher composite information recall scores ($M = 19.2$, $SD = 4.44$) compared to participants ($n = 111$) not exposed to closed-captions ($M = 17.73$, $SD = 4.34$). Male participants' ($n = 68$) scores were significantly higher ($M = 19.41$, $SD = 4.45$) than female participants' ($n = 135$) ($M = 18.04$, $SD = 4.35$), and participants who were sophomores ($n = 48$) had significantly lower scores ($M = 17$, $SD = 4.93$) compared to participants who were seniors ($n = 89$) ($M = 19.48$, $SD = 4.20$). Table 2 provides a summary of the individual group comparisons. Finally, a one unit increase in participant GPA (scale of 0 – 4) indicated an overall increase of 1.69 points in the composite information recall score.

Table 2. Study 1 Parameter Estimates Summary Table

| Parameter | <i>B</i> | <i>t</i> | Significance | <i>r</i> |
|---------------------|----------------|----------|--------------|----------|
| Exposed to Captions | 1.389 | 2.369 | .019* | .17 |
| No Captions | 0 ^a | . | . | . |
| Male | 1.337 | 2.146 | .033* | .15 |
| Female | 0 ^a | . | . | . |
| Freshman | -.421 | -.412 | .681 | .02 |
| Sophomore | -2.227 | -2.982 | .003* | .21 |
| Junior | -.610 | -.784 | .434 | .05 |
| Senior | 0 ^a | . | . | . |
| GPA | 1.696 | 3.687 | .000* | |

Note. Dependent Variable: Composite Information Recall Score*Note.* 0^a indicates comparison group*Note.* * indicates statistical significance at .05 alpha level

Composite attitudinal score. A linear regression analysis was used to analyze the data. Participants were omitted from this portion of data analysis if they disclosed that they were post-baccalaureate, they had a disability or hearing loss, English was their second language, or they had viewed the video previously. Participants were also omitted if they did not complete all of the attitudinal items. The total number of participants omitted from this portion of the study was 67; therefore, the total sample size for the statistical analysis was 139 participants. Scores on the fourteen attitudinal items were combined to create a composite attitudinal score, and all items had relatively high internal consistency ($\alpha = .800$). The covariate of participant age was not significantly related to the participants' composite attitudinal score. After controlling for the effects of the covariate of age, there was a significant effect of personal use of captions, $F(4, 115) = 3.57$, $p = .009$, $\eta_p^2 = .111$. No significant effects were found related to closed-captioning condition, undergraduate class, college in which participant major is housed, gender, race/ethnicity, or relationships with individuals with hearing impairments. $R^2 = .229$, indicating that approximately 23% of the variance in composite attitudinal scores can be accounted for based on the independent variables.

For parameter estimates, groups that had the largest number of participants were identified as the comparison group. Planned contrasts revealed that participants ($n = 7$) who personally use closed-captioning an estimated 51-75% of the time reported significantly higher scores ($M = 88.1$, $SD = 12.6$) compared to participants ($n = 74$) who personally use captions 1-25% of the time ($M = 77.81$, $SD = 22.61$). Table 3 provides attitudinal group comparisons based on the amount of time for personal use of captions.

Table 3. Study 1 Parameter Estimates Summary Table

| Parameter | <i>B</i> | <i>t</i> | Significance | <i>r</i> |
|----------------------------------|----------------|----------|--------------|----------|
| Never Use Captions | -2.284 | -1.04 | .299 | .09 |
| Use Captions 76-100% of the Time | 10.749 | 1.92 | .056 | .17 |
| Use Captions 26-50% of the Time | 4.782 | 1.64 | .103 | .15 |
| Use Captions 51-75% of the Time | 10.286 | 2.35 | .020* | .21 |
| Use Captions 1-25% of the Time | 0 ^a | . | . | . |

Note. Dependent Variable: Composite Attitudinal Score

Note. 0^a indicates comparison group

Note. * indicates statistical significance at .05 alpha level

Study 2

Procedures in Study 2 were similar to procedures in Study 1; however, participants in Study 2 were recruited through courses they were enrolled in, the test packet was completed on paper, and no monetary incentive was provided. All other procedures were the same, and the major variables were consistent across both studies.

Sample and Recruitment

During the spring 2014 semester, undergraduate geology and geography faculty teaching introductory courses were contacted and asked if they would be willing to allow the authors to facilitate the study as part of their courses. Faculty members viewed the global warming video and decided if it was appropriate for their courses. Five faculty members agreed to allow the authors to come to class on a specific date during the semester, show the video to students, and then administer the test packet. Students were notified ahead of time about the specific date when the study would be conducted and that their participation was voluntary. A total of 257 undergraduate students participated in the study. Five classes were used in the study, and the classes were randomly assigned “closed-captioning” or “no closed-captioning” conditions by the authors. Three of the classes took place in the same location (i.e., classroom). The other two classes took place at two different classrooms on campus.

Results

Composite information recall score. A linear regression analysis was used to analyze the data. Participants were omitted from this portion of data analysis if they disclosed they were post-baccalaureate, had a disability or hearing loss, English was a second language, they had viewed the video previously, or they did not provide a GPA estimate. Therefore, the total sample size for the statistical analysis was 216 participants. The covariate, participant’s grade point average (GPA), was significantly related to the participant’s composite information recall score, $F(1, 195) = 7.386, p = .007, r = .19$. The covariate of participant age was not significantly related to the composite information recall score. After controlling for the effects of the covariates GPA and age, there was also a significant effect of closed-captioning condition, $F(1, 195) = 4.15, p = .043, \eta_p^2 = .021$, gender, $F(1, 195) = 7.75, p = .006, \eta_p^2 = .038$, and race/ethnicity, $F(6, 195) = 7.43, p = .000, \eta_p^2 = .186$. No significant effects were found related to participants’ undergraduate class or college (e.g., business, education). $R^2 = .346$, indicating that approximately 35% of the variance in

| Source | SS | df | <i>F</i> | Significance | η_p^2 |
|----------------------|--------|-----|----------|--------------|------------|
| Captions/No Captions | 54.91 | 1 | 4.15 | .043* | .021 |
| Year In School | 93 | 3 | 2.34 | .074 | .034 |
| College/Major | 168.48 | 7 | 1.82 | .085 | .061 |
| Gender | 102.5 | 1 | 7.75 | .006* | .038 |
| Race/Ethnicity | 589.66 | 6 | 7.43 | .000* | .186 |
| GPA | 97.61 | 1 | 7.38 | .007* | |
| Age | 11.57 | 1 | .87 | .350 | |
| Error | | 195 | | | |
| Total | | 216 | | | |

composite information recall scores can be accounted for based on the independent variables. Table 4 provides a summary of the analysis.

Table 4. Study 2 Analysis of Covariance (ANCOVA) Summary Table

$$R^2 = .346$$

Note. Dependent Variable: Composite Information Recall Score

Note. * indicates statistical significance at .05 alpha level

For parameter estimates, groups that had the largest number of participants were identified as the comparison group. Planned contrasts revealed that seeing closed captions ($n = 90$) significantly increased composite information recall scores ($M = 20.5$, $SD = 8.85$) compared to not seeing closed captions ($n = 126$) ($M = 19.43$, $SD = 9.79$). Male participants' ($n = 124$) scores ($M = 20.71$, $SD = 9.81$) were significantly higher than female ($n = 92$) participants' ($M = 19.22$, $SD = 8.9$), and African American participants ($n = 30$) had significantly lower scores ($M = 15.25$, $SD = 4.62$) compared to Caucasian participants ($n = 147$) ($M = 20.37$, $SD = 7.27$). Finally, a one-unit increase in participant GPA (scale 0 – 4) predicted an increase of 1.61 points in the composite information recall score. Table 5 provides a summary of the individual group comparisons.

Table 5. Study 2 Parameter Estimates Summary Table

| Parameter | <i>B</i> | <i>t</i> | Significance | <i>r</i> |
|--------------------------------|----------------|----------|--------------|----------|
| Exposed to Captions | 1.072 | 2.03 | .043* | .14 |
| No Captions | 0 ^a | . | . | . |
| Females | -1.493 | -2.78 | .006* | .2 |
| Males | 0 ^a | . | . | . |
| American Indian/Alaskan Native | 4.460 | 1.14 | .254 | .08 |
| Asian | -.091 | -.059 | .953 | .004 |
| African American | -5.119 | -6.43 | .000* | .42 |
| Other | -1.164 | -.524 | .601 | .03 |
| Hispanic/Latino | -.355 | -.313 | .755 | .02 |
| Multiple Races | -.556 | -.584 | .560 | .04 |
| Caucasian | 0 ^a | . | . | . |

Note. Dependent Variable: Composite Information Recall Score

Note. 0^a indicates comparison group

Note. * indicates statistical significance at .05 alpha level

Composite attitudinal score. A linear regression analysis was used to analyze the data. Participants were omitted from this portion of data analysis if they disclosed they were post-baccalaureate, had a disability or hearing loss, English was a second language, they had viewed the video previously, they did not complete all of the attitudinal items, or they did not provide their age. Therefore, the total sample size for the statistical analysis was 220 participants. Scores on the fourteen attitudinal items were combined to create a composite attitudinal score, and all items had relatively high internal consistency ($\alpha = .810$). The covariate of participant age was not significantly related to the participants' composite attitudinal score. After controlling for the effects of the covariate of age, there was a significant effect of closed-captioning condition, $F(1, 195) = 5.54$, $p = .02$, $\eta_p^2 = .028$, personal use of captions, $F(4, 195) = 5.59$, $p = .000$, $\eta_p^2 = .103$, and gender $F(1, 195) = 8.44$, $p = .004$, $\eta_p^2 = .042$. No significant effects were found related to undergraduate class, participant college, race/ethnicity, or relationships with individuals with hearing

impairments. $R^2 = .244$, indicating that approximately 25% of the variance in composite attitudinal scores can be accounted for based on the independent variables. Table 6 provides a summary of the analysis.

Table 6. Study 2 Analysis of Covariance (ANCOVA) Summary Table

| Source | SS | df | <i>F</i> | Significance | η_p^2 |
|--|---------|-----|----------|--------------|------------|
| Captions/No Captions | 577.2 | 1 | 5.54 | .020* | .028 |
| Personal Use of Captions | 2328.74 | 4 | 5.59 | .000* | .103 |
| Year in School | 308.06 | 3 | .98 | .4 | .014 |
| College Major | 692.31 | 7 | .95 | .469 | .032 |
| Gender | 879.11 | 1 | 8.44 | .004* | .042 |
| Race/Ethnicity | 1209.58 | 6 | 1.93 | .077 | .056 |
| Contact/Individuals with Hearing Impairments | 186.05 | 1 | 1.78 | .183 | .009 |
| Age | 8.94 | 1 | .086 | .77 | |
| Error | | 195 | | | |
| Total | | 220 | | | |

$R^2 = .244$

Note. Dependent Variable: Composite Attitudinal Score

Note. * indicates statistical significance at .05 alpha level

For parameter estimates, groups that had the largest number of participants were identified as the comparison group. Planned contrasts revealed participants ($n = 89$) who saw closed captions reported significantly higher scores ($M = 81.15$, $SD = 27.10$) compared to participants ($n = 131$) who did not see closed-captions ($M = 77.62$, $SD = 29.53$). Participants ($n = 78$) who never personally use closed captioning reported significantly lower scores ($M = 71.52$, $SD = 24.32$) compared to participants ($n = 100$) who personally use captions 1-25% of the time ($M = 75.48$, $SD = 25.68$). Participants ($n = 6$) who personally use closed captioning an estimated 51-75% of the time reported significantly higher scores ($M = 85.06$, $SD = 12.06$), as well as participants ($n = 6$) who personally use closed captioning an estimated 76-100% of the time ($M = 85.56$, $SD = 12.24$) compared to participants who personally use captions 1-25% of the time. Female participants' ($n = 95$) scores were significantly higher ($M = 81.56$, $SD = 27.09$) than male ($n = 125$) participants' ($M = 77.21$, $SD = 29.96$). Table 7 provides a summary of the individual group comparisons.

Table 7. Study 2 Parameter Estimates Summary Table

| Parameter | <i>B</i> | <i>t</i> | Significance | <i>r</i> |
|----------------------------------|----------------|----------|--------------|----------|
| Exposed to Captions | 3.534 | 2.35 | .020* | .17 |
| No Captions | 0 ^a | . | . | . |
| Never Use Captions | -3.958 | -2.392 | .018* | .17 |
| Use Captions 76-100% of the Time | 10.085 | 2.15 | .032* | .15 |
| Use Captions 26-50% of the Time | 3.821 | 1.737 | .084 | .12 |
| Use Captions 51-75% of the Time | 9.588 | 2.07 | .039* | .15 |
| Use Captions 1-25% of the Time | 0 ^a | . | . | . |
| Female | 4.353 | 2.9 | .004* | .2 |
| Male | 0 ^a | . | . | . |

Note. Dependent Variable: Composite Attitudinal Score

Note. 0^a indicates comparison group

Note. * indicates statistical significance at .05 alpha level

Discussion and Conclusions

The results of the current research support the use of closed captions among a general college student population. Results suggested that participants who were exposed to closed captions performed better on the information recall assessment compared to participants in the no-captioning condition. Although different procedures were used in the current studies, the results were consistent with Lee and Meyer (1994) and Collins (2013) suggesting that closed captioning may help all students learn video-based information. There was no evidence that closed captions hindered information recall scores when comparing participants. This finding suggests that turning on closed captioning when showing a video to undergraduate students may be warranted.

Higher participant GPA's were also associated with higher information recall scores. Interestingly, in both studies, male participants scored significantly higher compared to female participants. Differences in recall performance among male and female students are something that should be examined further. The average GPA among males and females in both studies was not significantly different. It may be possible that male participants were more interested in the subject matter and, therefore, paid more attention to the video used in the research project.

Inconsistencies also existed between results of the two studies in relation to the information recall scores. In Study 1, sophomores had significantly lower information recall scores compared to seniors. In Study two, African-American participants had significantly lower information recall scores compared to Caucasian participants. Studies utilizing multiple videos that highlight different subject matter and associated assessments are needed to further examine differences among the year in school of participants, gender, and race/ethnic backgrounds.

Results of both studies suggested that participants who use closed captions more often in their daily lives have more positive attitudes toward the technology compared to participants who

use closed captions less often. Only in Study 2 did results suggest more positive attitudes among female participants compared to male participants. Although inconsistencies occurred, other attitudinal research has suggested females typically have more positive attitudes toward UD and disability-related issues (Hergenrather & Rhodes, 2007; Lombardi & Murray, 2011; Lombardi, Murray, & Gerdes, 2011; Rice, 2009; Upton, 2002). Additionally, in Study 2, those who were exposed to closed captions during the study reported more positive attitudes toward the technology compared to participants who did not see closed captions. These inconsistencies warrant further study across a larger population of undergraduate students at multiple postsecondary institutions.

Results of both studies suggested that closed captions may be beneficial for learning video-based information. Results also suggested that those who use the technology in their daily lives tend to report more positive attitudes toward broader use of closed captioning. Additionally, descriptive statistics in both studies revealed the average attitudinal response fell within the *somewhat agree* category. This suggests that, on average, participants had ambivalent to somewhat positive attitudes toward closed-captioning technology. Therefore, in a college classroom setting, it seems most students would not be opposed to viewing closed captions when viewing a course-related video.

Descriptive statistics in both Studies 1 and 2 indicated approximately 10% of participants reported *never* being exposed to course videos during college. Therefore, the majority of participants had experienced course-related videos at some point during their college careers. Approximately half reported being exposed to closed-captioning less than 25% of the time course-related videos were shown. An additional 33% ($n = 48$) and 27.7% ($n = 61$) respectively, reported *never* being exposed to the technology when course-related videos were shown. These descriptive statistics support the authors' assertion that closed captions are not routinely shown with course-related videos.

Based on the results of this study, faculty members are encouraged to "turn on" closed captions when showing course-related videos in class or for online courses. Another option is to allow students repeated viewing of a video on their own time and inform them that closed captions are available. Doing so may enhance learning opportunities for students taking courses and improve student attitudes toward the technology. The authors realize that it may be difficult, without administrative support or other institutional resources, for faculty members to ensure that all course-related videos have closed-captioning capability. For example, adding closed captions to a video may take significant time or cost money if other professionals add the closed captions. Therefore, more research on the educational impact of closed captioning for all students is needed in order to advocate for more widespread institutional support.

Limitations

The study took place at one university; therefore, the results are not generalizable to a whole population of postsecondary undergraduate students. Participants were not individually randomly assigned to a condition; rather, whole groups of participants were assigned to either closed-captioning or no closed-captioning conditions. Multiple classrooms were utilized during Study 2, and, therefore, room size varied. In both studies, data collection took place during different times of the day. Finally, only one video-based topic (e.g., global warming) was used for the studies. Ideally, multiple videos and corresponding assessments should be utilized.

Future Research

Almost no previous research exists on the use of captioning in college classrooms. Previous research that sampled from a general population has been limited in scope. The current study expanded upon previous research by completing multiple studies in different settings (e.g., classroom vs. computer lab), securing larger sample sizes, and group randomization. Results suggested that closed-captioning may be useful for learning in college courses when videos are shown. Therefore, the use of closed captioning in postsecondary settings using participants from a general student population warrants further study. Closed captioning benefits specific populations; however, measuring the broader educational impact of this technology is a worthwhile endeavor. Assessing educational technology for effectiveness is important prior to making recommendations for widespread use. Replication of the current study could be done by randomly assigning individual participants to a “caption” or “no-caption” condition. Future studies could collect data on an individual participant or group basis and should control for the influences of room size, video volume, and background noise. These factors may affect how participants learn via video-based information and perform on subsequent assessments. Furthermore, a large variety of videos and assessments should be utilized that cover different topics.

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Mission

Founded in 2001, the Journal of the Scholarship of Teaching and Learning (JoSoTL) is a forum for the dissemination of the Scholarship of Teaching and Learning in higher education for the community of teacher-scholars. Our peer reviewed Journal promotes SoTL investigations that are theory-based and supported by evidence. JoSoTL's objective is to publish articles that promote effective practices in teaching and learning and add to the knowledge base.

The themes of the Journal reflect the breadth of interest in the pedagogy forum. The themes of articles include:

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Style Sheet for the *Journal of the Scholarship of Teaching and Learning*

John Dewey¹ and Marie Curie²

Abstract: This paper provides the style sheet for the Journal of the Scholarship of Teaching and Learning. Manuscripts submitted for publication should adhere to these guidelines.

Keywords: radiation, metacognition, identity theory, constructivism, educational philosophy.

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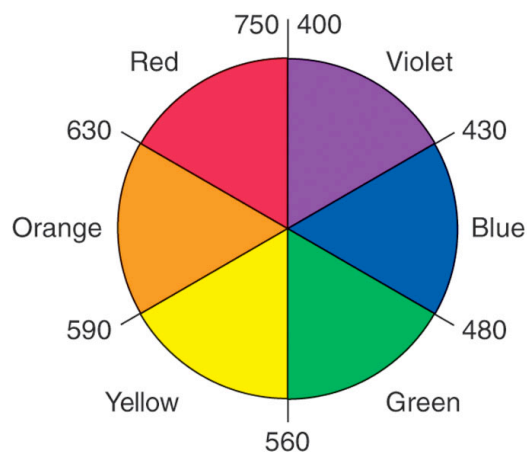


Figure 1. Color wheel with wavelengths indicated in millimicrons. Opposite colors are complementary.

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Appendix

Please insert any appendices after the acknowledgments. They should be labeled as follows:

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