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Journal Profile

The *Journal of Research in Business Information Systems* (JRBIS) is a national blind-reviewed, refereed publication published annually by the Association of Business Information Systems. This refereed journal includes articles from fields associated with business information systems focusing on theory, problems associated with information systems and information resources in education, business and industry, government, and the professions.

Manuscripts are selected using a blind review process. The first issue of the Journal was available Spring 2008. The Journal is listed in the ERIC Database and *Cabell's Directory of Publishing Opportunities* in Accounting, Computer Information Systems, Education, Instructional Technology, and Management.

2016 Editorial Reviewers

Circulation/Readership

The readership is comprised of college and university faculty, administrators, staff, practitioners, and students engaged in business information systems or preparing for careers in fields related to information resources. The journal is distributed electronically annually to all Association of Business Information Systems members as part of conference registration or membership. The journal is also available online at http://www.abis-fbd.org.

Call for Manuscripts

2016 Journal of Research in Business Information Systems (JRBIS)

Deadline: October 1, 2015

You are invited to submit manuscripts for publication consideration in the 2016 issue of the *Journal of Research in Business Information Systems (JRBIS)*, a national blind-reviewed, refereed journal published annually by the Association of Business Information Systems (ABIS). According to the Constitution and Bylaws of ABIS, the published articles of *JRBIS* are limited to the papers presented at the previous ABIS Annual Conference and/or published in the *ABIS Proceedings*.

This refereed journal includes articles from fields associated with business information systems focusing on theory; issues associated with information systems; and information resources in education, business and industry, government, and the professions. Manuscripts should address topics of interest to the wide-ranging interdisciplinary and practitioners who read *JRBIS*. The readership is comprised of college and university faculty, administrators, staff, practitioners, and students engaged in business information systems or preparing for careers in fields related to information resources. The journal is distributed electronically annually to all Association of Business Information Systems members as part of conference registration or membership. The journal is also available on the ABIS website for public scrutiny.

Submissions of manuscripts relating to topics, along with research findings, theoretical and practical applications, discussions of issues and methods for teaching and assessing instructional technology, and reviews of textbooks are encouraged. The *JRBIS* is listed in the ERIC Database and five separate volumes of *Cabell's Directory of Publishing Opportunities*, including Accounting, Computer Information Systems, Education, Instructional Technology, and Management. Manuscripts will be selected using a blind review process. Manuscripts should not have been published or be under current consideration for publication by another journal.

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All manuscripts must be submitted electronically in Microsoft Word format. Manuscripts, citations, and references must use the style format of the 2010 *Publication Manual of the American Psychological Association* (6th edition).

Submissions should include a separate file attachment for the title page that contains the following information in this exact order:

- Title of the manuscript
- Each author's full name; position/title; institutional affiliation, including address, city, state, zip code; home, office, and cell phone numbers; and e-mail addresses (identify the main author who should receive all correspondence).
- Number of words in the article (including all parts--everything)

- Biographical paragraph (50-60 words) for each author
- Any acknowledgments or information about manuscript history (e.g., basis in a conference presentation)

The second separate file attachment should be the manuscript file that begins with the title of the article, a 50-100 word abstract, 3-5 keywords or phrases describing the focus of the article, and the body of the manuscript. **Do not include any identifying information in this file. Do not include any personal identification or institutional affiliation in this file.**

The manuscript body must adhere to the following guidelines:

- 10-25 double-spaced pages (3,000-6,000 words)
- 1" margins all around
- Times New Roman, 12 font-size text within article
- Bold and center primary headings, with major words capitalized
- Bold and left-align secondary headings, with major words capitalized
- No footnotes or endnotes
- No page numbers or headers or footers

Tables and figures may have varying font sizes (but must adhere to APA Style). Include tables or figures formatted and placed correctly within the manuscript.

Include the References page (Works Cited only) at the end of the manuscript, followed by any appendix information, if necessary.

All submissions will be reviewed by the editor and two reviewers, using a blind-review process. Authors will receive feedback 6-8 weeks after the initial peer review. Manuscripts will be "accepted," "accepted with minor revisions," "possibly accepted after major revision and resubmission for further peer review," or "rejected."

The editor reserves the right to edit selected/accepted manuscripts for publication as deemed appropriate and necessary for the optimization of journal publication and format. The author of the manuscript retains responsibility for the accuracy of a manuscript published in the *Journal of Research in Business Information Systems*.

To ensure your manuscript is considered for publication in the 2016 *Journal of Research in Business Information Systems*, submit manuscript by *October 1, 2015*, to marcel.robles@eku.edu.

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Driving Innovation in a Knowledge-Based Economy—From STEM to STEAM

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Abstract

The innovation conversation in the United States has been centered on the importance of the STEM disciplines. STEM focuses on multidisciplinary, interdisciplinary, and transdisciplinary practices. However, innovation is not a skill to be learned; it is an outcome of collective and collaborative practice based on creative and critical thinking. By shifting the conversation from one about STEM to one of STEAM (STEM + Art = STEAM), we open up avenues for innovative ideas that are systematic, problem-oriented, and human-centered. "Design creates the innovative products and solutions that will propel our economy forward, and artists ask the deep questions about humanity that reveal which way forward actually is." (Maeda, 2012).

Keywords: Technology, Innovation, Education, STEAM

Introduction

Rhode Island School of Design has championed the new initiative of an equation of STEM + Art = STEAM (http://stemtosteam.org). In an ever increasingly technology driven and knowledge-based economy, the national emphasis has risen on technology, engineering, and mathematics (STEM) as a means to fill much needed positions. The Stem to Steam Organization proposes that, just as in the last century science and technology transformed our economy, art and design are in a position to do that for our future. By shifting the conversation from one about STEM to one of STEAM (science, technology, engineering, art, and mathematics),

avenues are opened up for innovative ideas that are systematic, problem-oriented, and human-centered.

Brown (2008), in the Harvard Business Review provided an article entitled, "The MFA is the New MBA." In a 2008 study by Robert Root-Bernstein, he made note of the fact that Nobel Laureates in the sciences were 22 times more likely than scientists in general to be involved in the performing arts. Robelen (2011) points out that Einstein was an accomplished violinist. Leonardo de Vinci, though probably best known for his art, was also a scientist, engineer, and inventor. Examples such as these may cause one to speculate about the place the "arts" have in the overall creative process. In the Harvard Business Review, Brown (2008) talks about leaving her job as a manager for a web company, and returning to school to obtain an MFA in fiction writing. She said, "I realized my MFA had been a pretty good management-training course. I didn't learn a thing about finance, but for two years, I'd practiced disciplined imagination—a requirement for innovation."

The focus on STEM has excluded the arts from the conversation. It might be important to note that though each of the areas of STEM is in itself important, and that the combination of the areas can lead to much more innovation. Dewey (2012) quotes David Rosen, "The technology in itself is not enough unless you have a vision of how it can be used. Sometimes having a vision of what is needed will lead to technological adaptations."

Rhode Island School of Design is not the only school that is joining the initiative. The University of Texas at Dallas has joined in the initiative by offering their "UTD STEAM Team." They offer camps to students in the Richardson and Dallas areas that allow participants the chance to participate in creative innovation (http://www.utdallas.edu/atec/steam/).

The goal of this article is to identify examples and perceptions of STEAM education, and illuminate three practical examples which embody the theoretical disintegration of disciplinary boundaries through transformative and authentic transdisciplinary practices of STEAM. The importance of considering adding the creative/art component to STEM education was discussed in a February 6, 2013 hearing of the U. S. House Committee on Science, Space, and Technology. Dr. Charles Vest, National Academy of Engineering President and formerly with Massachusetts Institute of Technology says arts are a very important part of technology education. Dr. Shirley Ann Jackson, President of Rensselaer Polytechnic Institute stated that their institution felt so strongly about this topic that they built a state of the art performance theatre that brings the arts, sciences, and education all together. A portion of this hearing that pertains to STEAM education can be seen on You Tube (https://www.youtube.com/watch?v=GU425V3NSkE).

Descriptive case studies are provided from experiences of practicing business professionals and designers who have engaged in problem- and project-based models of teaching and learning by embedding themselves in real world scenarios. Interviews were conducted with business people who previously participated in the Executive Business Games in El Dorado, Arkansas, over a seven year period, with the Executive Director of Digital Harbor Foundation Tech Center (DHFTC) in Baltimore, Maryland, and reflections on the use of MineCraft™ from one of the authors who conducted one of the case studies.

Collective and Collaborative Practice in a Knowledge-Based Economy

"At present, humanity doesn't seem to know what to do, since appropriate responses are likely matters of knowing differently not merely knowing more" (Davis, Sumara, & Kapler, 2008, p. 8).

Today we must contend with an almost overabundance of information. The scarcity principle no longer applies in relation to the dissemination of information. Instead of only being able to draw on the 100 books available in a local library on a specialized topic, individuals now have the ability to search the web and tap into an incredible knowledge store of information. What this means for the value of information is game changing; a new set of competencies come into play in relation to knowledge-based economies. Knowledge-based economies are predicated on the processes of creating, analyzing, evaluating, trading, and transforming knowledge. To this end, the postmodern world requires individuals to think and act in emergent and collective ways. What occurs in these interactions shifts the focus to the linkages between individual ways of knowing rather than knowledge. The scientist and the artist can create new avenues for discourse.

In terms of the relationships between kinds of knowledge, the space between disciplinary boundaries forms a new space of transdisciplinarity. Each collaborative participant comes with his/her own ways of knowing that are informed by both disciplinary and personal information. For Aristotle, ways of knowing are related to the process of learning; doing is related to the moral and social aspects of humanity; and making is about the artistry of production. Knowing encompasses the processes of insight, inspiration, and data collection. Doing involves the dispositions or mind-set. Making relates to the methodology for creating a solution or manifestation of an idea. Each of these processes is always intertwined. There is an understanding that the whole is greater than the sum of its parts; several disciplines are utilized and transformed through processes of deep engagement (Adler, 1978).

Integrating the "A" into STEM

The term “arts integration” is utilized in education settings to denote a curriculum that infuses its “academic” disciplines with art. Envisioning a continuum of integration practices in which there is no perceptible difference between adjacent practices, but drastic differences between the two extremes, can facilitate educators in locating the small changes that can yield tremendous results in educational practice and innovation. The two extremes of this continuum are disciplinary isolation and transdisciplinary practices (Harden, 2000); the discussion in this article will focus on the multidisciplinary, interdisciplinary, and transdisciplinary practices of the continuum.

Multidisciplinary practices are those that network together a number of disciplines through the use of a theme. For instance, a thematic structure such as “The Dynamics of Work Relationships” can be explored from the perspectives of science, math, language arts, social studies, and visual arts as separate entities within a network. Interdisciplinary practice allows for overlap through commonalities between disciplines, but may not directly reference the disciplines that are under study.

Transdisciplinarity is organized around student concerns and questions and accounts for the complex and interconnected network of contemporary society. The practice of transdisciplinary curriculum is based on the emergence of skills and concepts through the processes of problem finding and problem solving. Ultimately, transdisciplinary practice allows for an experiential approach to teaching and learning in which students and teachers engage reflexively (in the moment), and reflectively (after the fact) in a creative process which articulates the connections between and beyond multiple disciplines, and meets evolving objectives for each (Harden, 2000; Siverstein & Layne, 2014).

Problem-Based, Project-Based, and Choice-Based

Engagement with problem finding and problem solving formulates the core of both problem-based and project-based curriculum. The abbreviation PBL is often used to describe both problem-based learning and project-based learning models of curriculum and instruction. While the two models bear similarities and one can be embedded in the other, there are subtle differences between the two that are compounded by the interchangeable use of the abbreviation.

It was almost 100 years ago that Dewey advocated experiential/reflective learning which both problem-based and project-based learning stemmed from. He contended that, "If he cannot devise his own solution (not, of course, in isolation but in correspondence with the teacher and other pupils) and find his own way out, he will not learn, not even if he can recite some correct answer with one hundred percent accuracy" (Dewey 1916, p. 160).

According to Donnelly and Fitzmaurice (2005), project-based learning involves an activity that takes place over a period of time that culminates in a performance, product, or presentation. There is a timeline with checkpoints along the way for the assessment of progress. Problem-based learning is designed as a curriculum and process. Carefully designed problems are presented to students as a method of drawing out critical engagement of knowledge, skills, collaboration, and self-motivation.

In terms of problem-based learning in education, Sandra Kay (2013) describes her role: "...if I want my students to strive toward elegant solutions as they develop their creative thinking skills, then my role is to inspire with 'Elegant Problems'" (p. 31). According to Kay, these are not closed problems which are well defined, nor are they open problems which are ill defined. Instead, elegant problems elicit a multitude of elegant solutions over space and time, provide fluency, are flexible, allow for elaboration, encourage originality, and are relevant and meaningful to the learner (Kay, 2013).

Educators such as Douglas and Jaquith (2009), and Jaquith and Hathaway (2012) have discussed the benefits of choice-based methodologies. The goal of these methodologies is to teach for artistic behavior. Through making choices about their work, students engage in what the authors term: problem finding, problem solving, constructing knowledge, experimenting, working habits, representing, reflecting, connecting, and valuing (Doulas & Jaquith, 2009). However, Iyengar and Lepper (1999; 2000) suggest that too many choices may be detrimental to the learning process. They cite that students performed better in relation to assignment completion, form, and content when choices were limited.

Whether the problem or project is teacher created or discovered through real world application, creative constraints must be provided by the teacher or the scenario. Problem and project-based learning models require multiple perspectives and provide ample opportunity for objectives across and among disciplines. In problem- and project-based models, the cognitive load can be distributed amongst collaborators through combined efforts towards common objectives. This allows for the social construction of knowledge in order to form a shared meaning that takes into account the distribution of expertise within the group (Chernobilisky, Nagarajan & Hmelo-Silver, 2005).

The three case studies described in this article utilize properties of each of these methodologies in the production of curriculum. The Latin root of the word curriculum “currere” means to run or flow. In this form of curriculum, the processes of research and collaboration force emergent encounters with complex ways of knowing, doing, and making in the world (Pinar, 2004).

Case Study One: Digital Harbor Foundation Tech Center

The philosophy of student investment and personal meaning construction in relation to the making process is part of how the Digital Harbor Foundation Tech Center (DHFTC) formulates its curriculum. Founded by Shelly Blake-Plock and Andrew Coy in June of 2012, the mission of the DHFTC is to foster "innovation, tech advancement, and entrepreneurship by helping youth develop digital age skills through maker activities and tech workforce development." At the DHFTC, courses are offered in 3-D printing and fabrication, the use of micro-controllers and coding, podcasting, blogging, creation of games for iPhone and Android, circuitry, and MineCraft™. In order to engage in meaningful problem finding/solving, students and instructors learn new skills based on the contextual needs of the problem (Watters; Andrew Coy, personal communication, September, 2013).

Personally meaningful making applies multiple ways of "being a knower" into the educational experience.

> *Maker Education is fundamentally about making things -- which requires a wide range of knowledge and skills sets. For example, making a website requires knowledge of design, programming, communication, media, and a host of other all-too-often departmentalized skills.* (Andrew Coy, personal communication, September, 2013)

In terms of being a knower, students must become comfortable with fluidly shifting between disciplines. This is one of the most important parts of "being a knower", and how a student can engage with in the 21st century. Because of blurring disciplinary lines in the workforce and life, we need transdisciplinarity now more than ever.

What is really needed is a shift from "just in case" education to "just in time" learning. The process of quickly accessing information, sifting through an over-abundances of resources, and applying it to the current needs is a skill set that needs to be developed. Turning off cell phones, closing books, and isolation from all other sources of information, is a terrible way to test someone's ability. (Andrew Coy, personal communication, September, 2013)

Knowing is a process that culminates in making. Without making in a real world context, the information becomes confined to an individual's head. In looking at practices of the maker philosophy, knowing becomes a process of investigation through any means available to the learner. Access becomes essential when utilizing this type of learning. Barring students from access to large portions of culture(s) in which they live, limits what they are capable of relationally coming to know.

Humans are too imperfect to compete against machines -- but it is precisely this imperfection that makes us amazing innovators. How often do unintended positive outcomes come from a misunderstanding or a mistake?. . . Computers are too efficient to come up with meaningful new ideas. Computers don't have that ability. It is far too imperfect and imprecise of a process. (Andrew Coy, personal communication, September, 2013)

The human component allows for creativity through the rise of an unanticipated behavior. Students' ability to become comfortable with and even welcome failure is an important way of doing. It allows students to become risk takers, ultimately leading them to step outside their comfort zones when it comes to new ideas and concepts.

"In today's world, we need determination, grit, and passion (often described as "soft skills") in order to truly succeed" (Andrew Coy, personal communication, September 2013). Through addressing "soft skills," the DHF is reimagining how education functions to empower students in a world of constant change.

> *The most important perception we address is confidence -- confidence in one's ability to make something of value, confidence in one's ability to make something that is difficult, confidence in one's ability to make a difference. (Andrew Coy, personal communication, September 2013)*

Making a difference requires the processes of deconstruction and reconstruction. One must become capable of looking at the situation, and its circumstances from multiple perspectives. By taking apart the situation we become better capable of analyzing its parts.

> *Ultimately, the value one adds to the world at large is not in dissection but in creation -- in making. Dissection is merely a step along the path and should never be mistaken for the end goal. If you disagree, try just thinking about making a difference and then try going out and actually doing something. (Andrew Coy, personal communication, September 2013)*

At the DHFTC, students program apps, design games and instruments with MaKey, create new worlds in Minecraft™, and produce new objects through 3D printing. Making is also a pedagogical position. Makers engage in a process of teaching and learning simultaneously. With the advent of the Internet, information became accessible at the touch of a button. Instead of having to wait for instruction, makers teach themselves through making. When a problem arises, they must be responsive to the needs and triggers of their environment by adapting to

circumstances that are in constant flux. An internal feedback loop is created between teaching and learning, which results in engagement in meaningful problem finding/solving.

Coy notes that the factory model has shaped education and industry in the United States. Factory work does not require the implementation of transdisciplinary practice because it is, instead, about repetitive and efficient completion of a specific task. Furthermore, he claims that the factory mentality extends beyond the factory space, permeating all sectors of the community.

> *The crisis this country is facing is that the factory jobs are disappearing (and will continue to do so indefinitely). They are being replaced by machines that are far superior to humans at specific, repeatable tasks to be completed without deviation or variance. (Andrew Coy, personal communication, September, 2013)*

The new model for production in the 21st century is DIY, or do it yourself; everything is customizable. At the DHFTC, students utilized MaKey MaKey to design a controller that required them to collaborate with others. MaKey MaKey is a circuit board that turns everyday objects into a touch interface. A banana, playdoh, stairs, and even water can become an interface with the computer screen (Nanolab.com).

In order to create their controller, students engaged in the processes of making, tinkering, and engineering. According to Martinez and Stager (2013), *making* is the active construction of a product through the use of tools and materials, *tinkering* is a mindset that provides a playful way to engage with problems through experience, experimentation, and discovery; *engineering* forms a bridge between intuition and logic. Students built circuits through tinkering with materials, engineering, and using the tools at hand to make their desired game.

In a video produced for a course at DHFTC, a student states what she learned, “You have to split the playdoh apart or else it will make smoke which is what John did.” The student’s description referred to the need to separate the two pieces of playdoh due to their conductivity in relation to the circuit. This demonstrates the student’s ability to learn from her own mistakes as well as the mistakes of others. Learning through making means specific skills and concepts are applicable only if they can be applied to a process of making itself.

> *The only goal that really matters is whether something works and the only way to determine success is whether a student works until the thing being made works. The only “failure” as I like to put it, is “failing to improve”. That being said, changing directions, iterating, or shifting to something else is an acceptable and expected part of the process of the work. (Andrew Coy, personal communication, September, 2013)*

Case Study Two: Executive Business Games

In the1990s the State of Arkansas Department of Education co-sponsored with Arkansas Power and Light a competition for high school business students in the state in conjunction with state universities scattered geographically. The competition was named the Executive Business Games (EBG). Students in these “games” were part of a team that ran a fictitious company. The competition had three integrated parts: Rate of Return, Biennial Report, and Presentation to Share Holders.

This “game” was an excellent example of a transdisciplinary curriculum. Throughout an academic year students were able to develop higher-order thinking skills along with using problem finding, problem solving, and decision making skills. This created a true transdisciplinary practice, and an experiential approach to teaching and learning. The product

produced and sold by the company was changed each year, and voted on by the students at all schools.

The first phase was called "The Rate of Return," in which students were required to make decisions about various operating costs of a business. As a team, decisions were made and then phoned or faxed to the assigned university, and results generated. There were eight weeks of decisions. At the end of the eight weeks a ranking of total Rate of Return was generated.

The Stockholder Report was written based on the product, which explained the company and the progress made by the company during the fictional two-year period. It was published by the students. Students studied actual annual reports to understand the types of information they would need to include their company report. They had to plan for all of the layout, photos, financial reports, and the actual production of the report within a relatively small budget amount. In addition, they discussed other issues such as sustainability and environmental impact that they might need to address with their stakeholders.

The Presentation to Stockholders had students present to a panel of judges defending the decisions they made, and the results they had encountered. Again, the students needed to think about the decisions they had made during the rate of return portion of the competition, explain rationales that worked out well for them, or justify decisions that might not have worked out the way the team had intended. They needed to maintain the confidence of the stakeholders of their company. The judges posed questions at the end of the presentation about the various aspects of operations of the company. Students were able to answer these questions based on the knowledge acquired by knowing through doing.

Students had to create prototypes of various products that they could show to the judges. One example of a prototype was the year students were to run a company that manufactured

some type of sporting goods equipment. The students created the idea of a beeper ball that had an imbedded microchip that would emit sound with the use of a remote to help locate a lost ball. They created a prototype using half of a golf ball, and carved out an area to install a hearing aid battery that was supposed to be a microchip. Interestingly enough, fifteen years later a sporting goods company actually came out with a similar product.

The students in this case study attended a small high school in south central Arkansas. Teams of high school juniors and seniors from this school played the games from 1989 until 1997. Students who had been members of the teams were recently contacted and asked to reflect on the experiences they had in participating in the EBG nearly twenty years earlier.

Due in part to changes in operating software, the games were discontinued in 2000. Students who participated in the EBG have been out of high school for 18 to 25 years, and are now out in the workforce. Students were contacted to see what they remembered about their participation in the program, and to garner an opinion from them as to the effectiveness of the learning experience. Despite the many years that have passed, these students have vivid, positive recollections of the experience, and the lessons learned from it. The following comments are among those elicited – All are from survey results submitted electronically.

> *It [Executive Business Game participation] helped me gain confidence with speaking in front of people. It helped me learn how important being prepared is when trying to make others believe in what you're doing and selling. It also helped me understand how all different departments of a company come together to make a product work.*
>
> *I think it is so important to connect the usefulness of learning with real life. I hear a lot of kids ask when they'll ever need to use what they're learning.*

Participating in the Executive Business Games helped me understand the relevance in learning, which is the first step...and you could argue the most important step...in getting students to take their education seriously.

We did the simulated businesses. I loved doing that! I learned a lot about interdependence and all the different aspects of a business. ..never knew there were so many! I think it helped me see the Big Picture instead of the one little business separate from the others.

This was a good lesson about scale in business, interdependence, and how important it is to have good people on your team. I remember thinking a lot about R&D. ... The business of a company takes place on so many different levels and even if the levels may not interact regularly they definitely have an impact on one another.

Definitely helped me with future job interviews and taught me the importance of acting professional.

The presentation taught us about appearance, public speaking, team work and all the things previously mentioned. But it also taught us about spin! How we presented was just as important as how the company performed and could even help us make up for poor performance in one or two areas. EBG was a good experience. One of those things you don't really realize what all you're learning until later.

(1)Working together as a team through enabling each individual to play to their strengths by placing them in the right roles. (2) Public speaking and answering questions calmly when put on the spot. (3) Learning to be

accountable for all the logic that goes into the business and business plan. (4) One last thought: It is interesting to ponder the intersection of business and the arts, and we see this play out in society all the time (musicians, movies, books, etc.). Whenever art becomes "big" enough it inexorably becomes a business. Therefore it is up to the artist to understand how to control the boundaries of that business. Or someone else will do it for them.

From these few example comments, it is easy to see that the participation made a significant and lasting impression. One student, who now teaches at a university, said the Executive Business Games was perhaps the most beneficial experience of her secondary education. She said she learned things about business and her potential that she would not have learned otherwise.

The teacher of the class noticed a greater interest in the work for the class, and much more eagerness on the part of the students to put in time and effort for positive results. Students were given a chance to exhibit their knowledge and skills in ways that were not normally available in the traditional high school classroom. They took ownership of their own performances.

Case Study Three: An Arkansas Middle School Digital Prep Academy—Gifted and Talented Enrichment

MineCraft™ is a computer software that was created by Markus Perssons, and released to the public in 2009. Since its release, it has sold over 21 million Mac and PC versions (Mojang, 2015). MineCraft™ is also available for Xbox and PlayStation, and the pocket edition is available for Android, iOS, Windows Phone, and Amazon Kindle Fire.

The game play has two modes, survival and creative. In survival, the player must collect supplies in order to survive, but in creative, supplies are unlimited allowing the player to build anything he or she can imagine. Materials available for the player to build with include different types of stone, wood, wool, and minerals, and each block is the equivalent of one square meter.

During the spring of 2015 at an Arkansas Middle School Digital Prep Academy, students in the Gifted and Talented Enrichment classes worked on STEAM projects within Minecraft. Students were in grades 5th through the 8th grade, and each grade worked through in a multi-step process before completing a finished project within Minecraft.

For fifth grade, students completed two projects using Minecraft. First, students explored science and engineering by constructing wildlife crossings in Minecraft. Before building, students conducted research by examining statistics regarding the costs of cars hitting wildlife. Students also examined Banff National Park in Canada that includes 24 wildlife crossings, and also studied Utah, Wyoming, and Colorado by reading articles and watching documentary clips on their animal crossings. Students then began the design phase by sketching their initial thoughts on paper. Students had to cater their designs to the type of animal they wanted target, be it a larger or smaller animal. Students then had to consider what methods they would use to keep track of how many animals were utilizing the wildlife crossings.

After the design phase, students were then able to construct their designs. Some elected to build wildlife crossings that went above the road while others elected to create underground tunnels. Since MineCraft™ includes animals, it was very thrilling for the students when animals actually used their wildlife crossings. This feature of MineCraft™ required students to consider how their designs had to be modified so that animals were encouraged to use the crossings.

For grades seventh and eighth, students worked in small groups to create a civilization located on an island. First, students sketched out the island and structures on an 8.5 by 11 piece of paper. Then, students scaled the first draft up by gridding it out, and transferring it to a larger piece of paper which allowed students to include more details. After the mapping process, students then began building in Minecraft. At this point, students had the choice to either focus on the entire physical island, or focus on the structures themselves. This gave students the flexibility to cater their design process to their interests. Throughout the building process, students had to communicate and collaborate with each other. Conversations from students regarding the kinds of buildings and the amount of space needed came about naturally as they negotiated how to best utilize their building time. By the conclusion of the project, student projects included islands with constructed docks and tree houses, grand meeting halls, and elaborate courthouses.

The teacher of this class also noticed a greater interest in the work for the class, and much more eagerness on the part of the students to put in time and effort for positive results. The final assessment of this project consisted of a presentation given to pre-service educators at the local university about the projects they completed. Students discussed how they created their MineCraft™ structures along with the interdisciplinary concepts they learned while completing the project. They were proud of their accomplishments, and it was evident that they were invested in the learning experience.

Conclusion and Implications for Contemporary Arts Integration

When looking at the results of the cases reported in this article, it is easy to relate back to the findings of great minds in education. Aristotle's ways of knowing that relate to the process of learning with insight, inspiration, and data collection; the doing which is related to the moral

and social aspects of humanity; and of course the making which encompasses the artistry of production. The solution creation and manifestation of the ideas can be easily deciphered from these active learning examples.

In looking at the outcomes from the three case studies, it seems clear that participants took away an understanding that the whole was greater than the sum of its parts and realized that several disciplines were necessary components for understanding and excelling in the process. In each case the participants not only seemed to rise to the challenge, but because of the active learning seemed to enjoy the opportunity to learn in this manner.

In August 2014 on the AACSB website, information was posted about "The Framework to Flourish and Prosper" (http://enewsline.aacsb.edu/The-Framework-to-Flourish-and-Prosper.asp) where they discussed a new book "Flourishing Enterprise: The New Spirit of Business" and a conference, The Third Global Forum for Business as an Agent of World Benefit, that was held in 2014. They presented three "big" ideas for businesses from the book which included:

(1) changing the current idea of "environmental and social sustainability" to flourishing, which "engages and motivates people in an entirely different way."(¶4)

(2) making personal flourishing a priority, in that those who work for the business feel like an important part of the organization, where employees' values and organizations' values align, which "enables them to live purpose-driven lives." (¶5)

(3) creating an atmosphere of management practices where people can flourish such as meditation, journaling, poetry, music, and nature immersion to increase a sense of connectedness both to one's self, those they work with and for, and with the

world as a whole. They suggest that, "such reflective practices—and the sense of connectedness they produce—are a gateway to personal flourishing." (¶6)

These new ideas about flourishing, where personal flourishing translates to flourishing in business, in all probability, will garner many skeptics, just as the idea that STEM can be enhanced by transforming to STEAM. However, in actuality, these two are suggesting very much the same thing, the transdisciplinary approach to learning as well as work.

Instead of focusing on the way things have always been done, one can both deconstruct and reconstruct models of business practices. This relates not only to the STEM disciplines but perhaps a step further to entire business models as completely new systems.

Education and business models in the United States were formulated around the need to produce factory workers and managers of industry. Today's economy is focused on the plethora of information that exists in both digital and physical form. Individuals involved in business practice must become proficient with the construction analysis and application of data that is present within our knowledge driven economy. These practices require the use of multiple perspectives that are derived from ways of knowing, doing, and making that are transdisciplinary in origin.

Perhaps a final thought for the conclusions and implications can be taken from a statement from Dewey's Pedagogical Creed. We, "believe that when science and art thus join hands the most commanding motive for human action will be reached; the most genuine springs of human conduct aroused and the best service that human nature is capable of guaranteed."

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Overcoming Obstacles in Teamwork in an Online Course

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Abstract

Team work is often a challenge in course, and it becomes more cumbersome when working collaboratively online. This study compares online and face-to-face courses that use team work, and makes recommendations for a more effective online team experience. The findings show that students continue to experience problems in teams even in upper level courses, therefore instructors must continue to provide direction to overcome obstacles in an online course.

Keywords: online education, collaborative learning, communication in teams, pedagogy

Introduction

"This is an online [course], WHY do we have to work in teams?" This is a common question for instructors of online courses, and a response may be that students are likely to have to work collaboratively in a virtual environment in their own careers. Hazari and Thompson (2015) discuss this resistance, and present that working in groups online provides the students, "an opportunity to work outside their comfort zone to understand the nuances of teamwork so they can be productive members of a business team" (p. 46). One of the purposes of learning in college is designed to help students transition into a work setting that is likely to require collaboration skills.

A common technique for teaching many topics and helping students learn collaborative skills needed in the workplace, group work is ideal for learning. Educators often use group work as a method to help students work together, and learn from each other (Gottschall and Garcia-Bayonas, 2008). The idea of group work is reinforced by the Association to Advance Collegiate

Schools of Business (AACSB), which encourages teamwork in Standard 13. Standard 13 states students should be involved in the learning process through collaboration and cooperation (AACSB, 2012). This standard shows the importance of students working in groups.

In addition, The National Survey of Student Engagement (NSSE) reports that 63% of seniors in higher education often work on projects with other students (NSSE, 2013). However, NSSE also reports that online students are less likely to work collaboratively, even though it reports that, "Collaborating with peers in solving problems or mastering difficult material deepens understanding and prepares students to deal with the messy, unscripted problems they encounter during and after college" (p. 42).

According to the AACSB, "Each student is a resource who brings unique experience and knowledge to combined tasks. Students need to acknowledge their responsibilities to their fellow students by actively participating in group learning experiences" (2012, p. 58). Learning these skills is important for success in the workforce where collaborative skills are needed for success. Companies use collaboration to meet goals, and textbook authors Thill and Bovee (2013) state that collaboration, "has become a core job responsibility for roughly half the U.S. workforce." (p. 35). They continue that one can expect to collaborate in at least some of their work, regardless of which career one enters.

As shown in the NSSE study, group work is prevalent in college, and AACSB standards stress the importance of collaboration. With this focus on learning to work together, faculty members often struggle to find the right methods to help students learn these valuable skills for their future careers. Instructors must consider many dynamics in task design. One aspect to consider is how many students should be included in a team. Peterson (2013) points out that, "group work is work, for both students and instructors" (p. 30).

A quantitative study by Gottschall and Garcia-Bayonas (2012) found that students majoring in Business Administration were more likely to have an unfavorable attitude toward group work than Education or Science majors. Survey responses stated that trying to meet outside of scheduled class time was a major obstacle to group work. Free-riding concerns were also more prevalent with Education and Science majors than with Business majors.

Working in a business environment certainly requires good team skills; however, the above study shows that business students are unhappy with team work in college. If these negative viewpoints transfer to the workforce, it can be detrimental to students. Working in groups can be burdensome for both instructors and students. With the steady increase in enrollment in institutions of higher education, and continued emphasis on budget cuts, many faculty members are experiencing increased class sizes. This only serves to exacerbate the difficulty in structuring the optimum collaborative learning environment.

Social loafing, as referred to by Aggarwal and O'Brien (2008), is often the most significant problem in a group setting. They state, "It takes only one social loafer in a group to affect the dynamics of the entire group. Social loafers contribute less than their fair share to group effort but reap the benefit of other members' efforts because of a common grade for the entire group" (p. 256). Aggarwal and O'Brien (2008) conducted a study of marketing classes to make suggestions on how to design a successful group project. Their main suggestions include breaking a project into smaller components, limiting the size of the group, and using peer evaluations. There is no ideal group size, but Peterson (2013) suggests keeping the size between two and six members and, similarly, Hazari and Thompson (2015) suggest keeping the size between four and five students in an online environment.

Hazari and Thompson (2015) discussed the importance of faculty interaction in the group process, even in an online class. They felt that instructors who taught online "must implement sound, practical strategies to provide students with the tools and feedback necessary to complete assignments" (p. 47), because it caused students to perceive that their instructors were interested in their success in the course.

Likewise, King and Behnke (2005) find that students fear being evaluated as a group, which makes students dislike group work. Because of this, they state that instructors should not assign one grade to every group member. Peterson (2013) stresses equity in group work, expressing that individual group members need to be held accountable in the work. Therefore, students should evaluate others, and these evaluations should be incorporated into part of the grade for the project. King and Behnke (2005) do not advocate allowing group members to fire others because firing group members does not address the problem.

The Study

The two instructors in this study have used group projects in their online and face-to-face classes for several semesters. As class sizes began to increase in Instructor A's upper-level business class, he increased the group sizes to approximately eight students to help divide the workload into smaller units for the students, and to help him with grading. The teams were randomly created using the school's learning management system (LMS), and were assigned a real-world business case study in the textbook to analyze. The teams were structured to mimic real-world self-managed work teams as closely as possible. Instructor A did not provide any type of team building lessons because almost all of the students were business majors, so it was assumed the students had previously taken a business communication course that taught some

aspects of teams. In this semester, Instructor A had two face-to-face classes with an enrollment of 109 students, and one online class with an enrollment of 56 students

Also referred to as self-directed work teams, self-managed work teams (SMWTs), are typically composed of 10-15 people given many of the responsibilities of their former supervisors (Robbins, 1996). Similarly, Yeatts and Hyten (1998) state that SMWTs usually consist of 5-15 people. Based on these sources, students can expect to work in larger groups than they may have experienced in college.

Thill and Bovee (2013) present teams as part of an organization's idea of participatory management that involves employees in decision making. These SMWTs, which operate with a degree of autonomy with minimal direction from their supervisors, are responsible for their own work scheduling, work approach methods, workload distribution, and performance monitoring (Muthusamy, Wheeler & Simmons, 2005). This performance monitoring is reflected in peer reviews conducted by members of the team. The utilization of SMWTs by Fortune 100 companies grew from 28% in 1987 to 72% by 1999 (Muthusamy, Wheeler & Simmons, 2005). A significant amount of research surrounding the use and effectiveness of SMWTs has been conducted over the years. Examination of recent research gives no indication of any substantial change in the size, structure, autonomy, or use of SMWTs over the last 25 years.

Electronic communication tools, such as discussion boards, emails and chat rooms, were created for each team within the LMS. These tools were created to facilitate information sharing outside the boundaries of face-to-face team meetings. While the project had specific format guidelines regarding the finished product, latitude was given to the teams to formulate their own project approach planning and workload distribution. At the conclusion of the project each team member submitted peer evaluations of each of their team members, evaluating those individuals'

performance and contributions throughout the project. These evaluations were taken into consideration when assigning individual grades for the project.

Instructor B taught small lower-level business classes that included students from all majors. With few exceptions, group sizes were kept small with only four members. She felt that keeping the groups small would help the students to coordinate their schedules, and divide the work easier. Students were given some choice in group composition because groups were assigned by a mixed method: both self-selection and randomization. In the face-to-face class, students were allowed to pair up. Then these pairs were grouped together into groups of four by the instructor. In the online class, students signed up for a topic in the learning management system, and groups were created by the topic selection. Each team was assigned a topic to research. Prior to beginning group activities, the students learned background information about forming groups, and group dynamics from the textbook and class lecture.

In this semester, Instructor B had two face-to-face classes with an enrollment of 60 students and one online class with 32 students. Upon group formation, each group was to complete a written team agreement that specified how the work was to be divided and established some group norms.

Communication tools were also created in LMS and discussed with classes, however it was not required that students use the tools. In fact, few of the groups showed activity in these tools. The group chose a research topic, completed individual research, wrote a summary report, and presented their findings in an oral presentation. The project was divided into smaller units with dedicated deadlines. This helped each group to divide the tasks, and preliminary work was graded on an individual basis. At the end of the approximately four week project, the groups

submitted their findings in both written and oral forms as a team grade. In addition, each group member evaluated other members for a portion of the individual's grade.

At the end of the semester, the students in all of the course sections studied were given an eight question survey administered through the LMS. Students were asked about their general view of group work, how large their group size was, what they thought the group sizes should be, and how they should be evaluated. The survey ended with an open-ended question that allowed the students to provide additional input. Students were given a small amount of extra credit for completing the survey because it was believed this would increase the response rate. Overall, 67 students in Instructor A's classes completed the survey for a response rate of 41%. Overall, 48 students in Instructor B's classes completed the survey for a response rate of 52%. The response rate for online students was much higher with 75% of students participating. The higher response rate for the online students is likely attributed to course work being completed online, which makes it more convenient for these students to access the survey.

The Results

Student responses to the survey were mixed regarding opinions of group work. There were no students in any class studied stating they had never been involved in group work in college. However, overall 17% of students indicated they had only minimal experience in group work. As expected, students in the upper level class reported more group projects in their college classes.

Students were asked about their perception of their group size in the course they were surveyed. Responses to the question, "Considering your group work for this class, what is your perception of the biggest issue related to the number of people in your group?" show that students in smaller groups prefer these smaller group sizes. The online class responded

positively 100% of the time that their group of four was ideal. Even the online course preferred this size 79% of the time. These responses are shown in Table 1 below.

Table 1
Group Size Perception

	Small Groups Face to Face	Small Groups Online	Large Groups Face to Face	Large Groups Online
My group was just the right size.	100%	79%	35%	41%
My group was too large and it was difficult to divide the tasks.	0%	4%	35%	7%
My group was too large and that caused more members to free ride.	0%	13%	23%	37%
My group was too large and that made it more difficult to reach consensus.	0%	0%	8%	4%
My group was too small and that made it harder to divide the tasks	0%	4%	0%	0%

Students placed in the large groups had mixed reactions. Only a little more than one-third of students felt that the larger group size of eight was ideal. Respondents were more likely to believe their groups were too large. With the larger groups, face-to-face students felt their obstacle was dividing tasks among group members, however, online students felt the larger groups allowed for free riding, or "social loafing."

When questioned further about issues with group work, regardless of group size, student responded to the question, "Considering your group work for this class, what is your perception of the biggest issue related to the number of people in your group?" Students in all classes felt that communication was a major issue. The issues seemed to be more pronounced in online classes as shown in Table 2 below.

Table 2
Obstacles in Group Work

	Small Groups Face to Face	Small Groups Online	Large Groups Face to Face	Large Groups Online
Dividing the tasks	13%	13%	15%	12%
Communication among members	25%	58%	28%	41%
Too many trying to be the leader	0%	0%	5%	4%
Someone acting like a free rider	25%	3%	28%	26%
Personality conflicts	8%	0%	0%	0%
Procrastination	29%	25%	25%	19%

Someone acting like a free rider was an issue, but the smaller groups in the online class seemed to have the least problem with free riding. Students in all classes also reported difficulty dividing the tasks among members.

Because group work usually entails the student group turning in a completed assignment, there is always a question of how to evaluate the work of individual students.
Students were asked, "What is the best way to evaluate a student's contribution to the group?" A few students felt that the entire group should receive the same grade because they felt it was not possible to tell which group members contributed. However, more than 50% of students in each class felt group members should provide feedback on grading on other group members' performances. The face-to-face classes felt the strongest about this; showing 79% and 80% of respondents wanted a chance to influence the grades of others, as shown in Table 3 below.

Table 3
How to evaluate a Group Project

	Small Groups Face to Face	Small Groups Online	Large Groups Face to Face	Large Groups Online
It's not possible to evaluate separately, therefore everyone in the group should	8%	8%	0%	15%

receive the same grade.				
The instructor should monitor group performance and allocate different grades to different group members.	0%	21%	5%	22%
Group members should evaluate other group members and provide feedback toward the final grade.	79%	71%	80%	52%
Group members should evaluate other group members and have control over the final grade given to each group member.	13%	0%	15%	11%

Less than 15% of students wanted to have total control over another student's grades, instead opting to provide input and letting the instructor have the final say over the grade.

Findings

Following the AACSB standards, students were showing they had been involved in group activities while in college, and 83% had agreed they had participated in group work at least some. As could be expected, the upper level students reported the most experience with working in groups.

Students reported the most prevalent concern was communication. Even in the face-to-face classes, where students were allowed at least some class time to work on projects, teams still reported issues. Understandably, the problem was more pronounced in the online courses. Students were given the discussion boards in the LMS to post their portions of the project and to discuss the project, but they still struggled communicating with group members. One student

commented that they felt the instructor should have at least one mandatory assignment that required the group to use the discussion board.

One situation observed by instructors was that students in the online course were trying to meet physically to complete parts of the project, and several students made comments that the larger groups made it difficult to find a time to meet. There were times when students voiced frustration directly to the instructor that they were being left out of group work because the members that were physically present on campus were meeting without them. One student in the online upper level course with eight members stated, "My group always wanted to meet between 6-8pm. That was impossible for me. . . . IF I have to do group work, I would rather it be 2-3 people, but I think group projects should be done away with." This perceived need to meet is an interesting paradox considering the pervasiveness of computer-mediated communication (i.e. texting and social networking) with the current generation of students.

One of the problems with the group experience involved dividing the tasks because students seemed to want the instructor to provide a clear delineation of task division. The larger group completed a case problem with a set of questions, but since there was not the same number of questions as group members, there was some dissention. One student commented, "Group size would be more effective if there were enough members to evenly distribute the work, that way people don't have to double up on a question so that everyone can have a clear contribution to the project." Students were very concerned with fairness, but they wanted the instructor to be more involved in task division. Even in the smaller online group, one student felt the group was too large and commented, "There wasn't enough work for everyone to have an equal part in the assignment."

Free riding, or social loafing as reported by Aggarwal and O'Brien (2008), was also reported as a problem. Approximately 25% of students in each class stated it was an issue, but the online students in the small groups only reported free-riding 3% of the time. This could be explained in that the smaller groups meant there were fewer chances for team members to fall behind.

Students wanted the opportunity to evaluate others, but they did not want the responsibility of total control over someone else's grade. They were usually very vocal, face-to-face or online, about how their group work was progressing, but they did not always hold others accountable at the end of the project. Although they may have complained throughout the project, many students often gave good marks to the same students they complained about. Student comments indicated they wanted the instructor to be more involved in monitoring group activity in the discussion boards. One student commented, ". . . the instructor should have direct oversight in everyone's input."

Students felt it was the instructor's responsibility to assign grades and wanted the instructor to make the decisions. Students were allowed to fire, or divorce, their group mates, but this rarely occurred. As suggested in King and Behnke's (2005) study, students were not allowed to simply terminate a group member. Instead, the team was assigned to complete a team agreement when teams were formed. In the agreement, they were to specify how they would handle someone who was not performing up to expectations. In particular, a team member had to be warned before being fired. This usually forced a conversation with group members, and made them address team issues.

Future Research

Future research could focus on improving the group experience for online students to help with communication. Because it appears many of the online students are still treating the course as a face-to-face course in some cases, this diminishes the experience of working collaboratively from a distance, which is likely to occur in a real workplace setting. However, as the NSSE survey (2013) indicates, students in an online environment are less likely to work in groups.

Conclusion and Implications for Practice

As shown in the upper level course, students still need guidance in group work as referenced in Hazari and Thompson (2015). Instructors should develop supplemental training components designed to engage students throughout the group project. This has shown to be particularly essential for online students.

In addition, groups reported difficulty in communication and dividing the tasks. Whether online or face-to-face, they requested that instructors be more involved in the projects. This may be an unrealistic request because graduates working in groups will need to work independently to complete a task in a workplace setting, as shown by Thill and Bovee (2013). The Society for Human Resource Management conducted a study in Spring 2013 found that 90% of HR professionals believed that feedback from multiple sources, which often includes employee peers, was a more accurate measure of employee performance.

Students may need more direction on working through team issues before a large project is designed. Paradoxically the online student, who may be heavily engaged in multiple forms of electronic social media for personal use, is likely to need even more direction on how to collaborate in a truly online environment. Written comments on the peer evaluations and

postings within team discussion boards give strong indication of a student paradigm dichotomy as it relates to electronic communication within group settings. Students appear to easily gather and share information electronically in non-school related group functions, while exhibiting difficulty doing so for class-related group projects. One might postulate this may be primarily due to early school group work that relies solely on face-to-face interaction. This experience may prompt students to subconsciously associate all school group work with face-to-face meetings.

The suggested supplemental training and guidance needs to contain not only an emphasis on the mechanics of effective team operations within an online environment, but must also include thorough discussion of the why. The ostensible lack of understanding of the reasons for online group work may be a significant impediment to the students making the necessary paradigm shift away from all group work being face-to-face.

Additionally, team sizes should be limited. This finding is supported by Peterson (2013) and Hazari and Thompson (2015). Student satisfaction was higher in both the online and face-to-face classes when groups were about four members in size. As stated previously, this may be due in a large part to students' prior experience with group activities.

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Promoting Student Engagement in Online Classes: The Student Perspective

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Abstract

Given the popularity of distance education, educators must seek out ways to effectively engage students in online classes. A survey was administered to online students (n=52) to better understand their experiences with distance learning, in addition to their preferences when taking online classes. By going to the source and asking students their perception of online class engagement, instructors are better able to understand the types of course activities the students find meaningful. Additionally, a better understanding of the students' view on the benefits and challenges of completing courses online was obtained.

Keywords: online education; distance education; student engagement

Introduction

It is no secret that the popularity of distance education is on the rise. Technology has improved over time providing additional options for improving the online learning experience for students. Allen and Seaman (2014) recently reported that 7.1 million students in the United States were enrolled in at least one online course in the fall 2012 semester; however, according to The Integrated Postsecondary Education Data System (IPEDS) data, that number was closer to 5.5 million. Of the 5.5 million figure reported, approximately 2.6 million students (nearly half) were enrolled only in distance education courses (U.S. Department of Education, 2014).

Friedman and Friedman (2013) highlighted the changes in distance education from the previously popular correspondence courses. In today's digital classroom, it is crucial that elements such as communication, engagement, active learning, and interaction are included

within the class. To effectively teach online and reach today's distance learner, students must be required to do more than read a textbook and take a corresponding exam. With a growing subset of the population choosing to further their education through distance learning, it is important that educators understand how to best structure the course for students to learn the material, and be able to apply it to real life situations. Best practices related to distance education suggest that courses should include three types of interaction: student to student, student to instructor, and student to content (Anderson, 2003). Recognizing the unique needs of distance learners, attention should be given to how to appropriately and successfully engage them in their online course(s). This study surveys current online students to gain insight into their perspective of distance education, and their level of class engagement.

Literature Review

Angelino, Williams, and Natvig (2007) draw on related literature to paint a picture of a typical online student. Diaz and Bontenbal (2001) note that distance education students tend to be independent, internally motivated individuals. In addition, they are often self-directed and autonomous (Diaz & Bontenbal, 2001). Hughes (2004) mentioned that distance learners want online services that are user-friendly, and available when it is convenient for the student.

The number of online students has surged in recent years, but the literature suggests that online courses have higher attrition rates than face-to-face courses (Angelino et al., 2007; Carr, 2000; Moody, 2004). In a training scenario involving 479 adults completing online Microsoft Excel training, the trainers decided to ask self-regulation questions throughout the training experience. These questions would ask the student if they understood key points, or if they should study more before advancing. With half of the students not being asked such questions, the attrition rate was 17% higher than with the students who were asked the questions. In

addition, the students who completed the training with the questions had a final score of 81 percent as compared to the 76 percent of the control group (Sitzmann, 2010).

According to Moore (2002), the following elements were identified as key factors in terms of student satisfaction with the online method of delivery:

- Performance-based orientation
- Group work
- Collaboration
- Instructor presence
- Chances to reflect
- Clear directions
- Focus on ideas as opposed to facts
- Equal opportunities to participate

The internet affords instructors the opportunity to offer enhanced learning experiences and effectively teach a myriad of learning styles; however, faculty must also rethink the ways they teach and engage distance students (Salazar, 2010).

In a study of massive open online courses (MOOCs), eight courses with enrollments ranging from 2,844 to 120,784 were examined. When learning communities were developed where students could meet with smaller numbers of their classmates, involvement and engagement in the course were improved. Three critical factors relating to student engagement were discussed: collaborative student interaction, assignments that were open-ended, and learning communities to allow networking (Trumbore, 2014).

Essential to engaging an online student is creating interactions that are meaningful (Salazar, 2010). Salazar (2010) contends that "online students perform well when they

experience a sense of community between their instructor and fellow peers" (p. 54). In addition, the way in which a course is set up can impact the level of engagement students' experience. Incorporating group activities or assessments that require varied levels of thinking allows students to participate in collaborative work which can address a wide array of learning styles (Salazar, 2010).

Wilson and Allen (2011) posit that "instructors may need to make a more conscious effort to engage students during online instruction as they would when meeting with them face-to-face several times a week…" (p. 5). According to Hogg and Lomicky (2012), interaction is essential in online courses because students expect it to take place. Previous research found that students feel they learned more when there were higher levels of student-teacher interaction, and that peer interaction shaped students' views of the course (Herring & Clevenger-Schmertzing, 2007). Suttle (2010) examined benchmarks such as collaborative learning and student-faculty interaction to determine that they were highly related to engagement in online courses.

Young and Bruce (2011) note that "when instruction is designed to actively involve learners in meaningful tasks, students' sense of engagement may be elevated. Student engagement and sense of classroom community are closely related to one another; students who feel a sense of connectedness rather than isolation are very likely better prepared to become more actively involved with course learning, successfully persist, and experience real world success" (p. 227).

Methodology

In fall 2014, 52 students enrolled in online business courses taught by three different instructors completed an online survey about their experiences with distance learning. Students from two institutions in the southwest region of the United States (one regional comprehensive

university and one community college) were surveyed to add diversity to the sample. This convenience sample allowed for a wide range of responses that can be used to better understand how students perceive online courses, and their level of engagement.

The survey included questions about the current online class in which the survey was administered, as well as their overall view of distance education. In addition, demographic questions were asked about the student (e.g. age, gender, GPA, full time vs. part time student status, number of online classes taken, etc.). When instructed to consider one online class, students were presented with ten statements including "This online class was more interesting than a traditional face-to-face class," "This class allowed me to interact with other students," and "I worked harder in this class than in a traditional face-to-face class." For each statement, students responded on a 1 – 5 Likert scale (1: strongly disagree, 5: strongly agree).

In the next section of the survey, students were asked to respond considering all the online classes they have taken. The same 1 – 5 Likert scale was used for the eight statements. Examples of the statements include "If students just read the textbook, they will be able to pass an online course" and "When students have an option between an online section of a course and a face-to-face section of the same course, they choose to enroll in the online section."

At the end of the survey, participants were asked three open ended questions for which they could type a response: 1) What are the benefits of taking an online class? 2) What are the challenges of taking an online class? 3) What should be included in online classes to help you feel more engaged?

Findings

Of the 52 respondents, the majority (75%) were female. A slight majority (54%) identified themselves as 20-25 years old, but there was diversity in the respondents' age. Of

those who participated, 9% were under 20, 6% were 26-30, 11% were 31-35, 10% were 36-40, and 10% were over 40.

For 90% of the respondents, the survey was administered in a class that was not their first online class. Figure 1 shows the breakdown of the number of respondents who reported having taken one to three, four to six, seven to nine, or ten plus online classes.

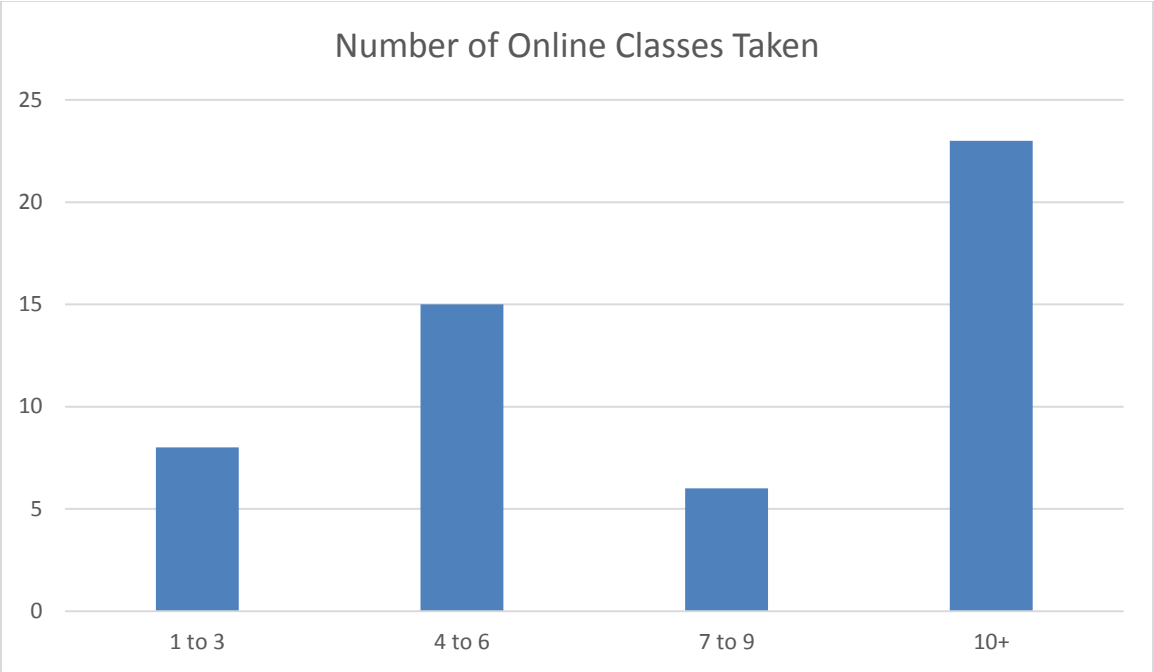

Figure 1. Number of Online Classes Taken

As shown in Figure 1, many survey participants have taken ten or more online classes. When asked why they chose to enroll in the online class, many students cited work or family obligations as their motivation, as well as geographic distance from the campus.

Students were asked to consider the online class in which the survey was offered, and respond to statements on a scale from 1 – 5 (1 is strongly disagree, 5 is strongly agree). Figure 2 contains some key findings from the survey.

Statement	Mean Response
This class allowed me to interact with other students.	3.85
This class allowed me to interact with the instructor.	3.83
I like the variety of learning experiences I had in this class.	3.73
I like the interaction with other students that this class offered.	3.46

Figure 2. Class Specific Survey Findings

After being asked to consider just their current class, survey respondents were asked to consider all the online classes they have taken. Once again, a 1 – 5 scale (strongly disagree to strongly agree) was used to measure the students' level of agreement with statements. Figure 3 contains mean survey responses for survey questions related to online classes in general.

Statement	Mean Response
Timely feedback from my instructor is essential to my success.	4.40
Including asynchronous (not at the same time) components (such as discussions) in online courses is beneficial.	3.71
Online courses should be interactive (including components such as chat or discussion or team work).	3.54
Including synchronous (at the same time) components in online courses is acceptable (for example: class chats, group meetings, etc.)	3.37

Figure 3. Survey Findings Regarding Online Courses

When students enrolled in online classes were asked the benefits of distance education, several themes emerged as common responses, including the following:

- Accommodates their schedule and work/life demands
- Ability to work at their own pace without classroom distractions

- Convenient and reduced travel time
- Flexibility
- Builds discipline and teaches time management skills

However, these distance learners also identified challenges with taking online classes. Challenges identified include:

- Necessity to be self-motivated and disciplined
- Time management
- Group assignments
- Lack of face-to-face communication
- Internet/technology issues
- Delays in email responses/grades from professors

When students were asked what should be included in online classes to help them feel more engaged, numerous suggestions were provided. As it relates to course content, the respondents suggested instructors provide video lectures or podcasts to reduce the amount of reading involved. The traditional focus on reading could contribute to the students' perspective that they teach themselves in online classes. When presented with the survey statement, "Students basically teach themselves in online courses" the mean response was 3.42 on a 5 point scale. In addition, group projects were cited as a way to engage students in an online setting. The use of social media such as Facebook groups also help students feel more connected to their peers and their instructor in an online setting.

Interaction was a second theme that emerged from the student responses to the question about engagement in online classes. Several students suggested including optional face-to-face class meetings. Similarly, class chats could be incorporated to help students feel connected

virtually without meeting face-to-face in the same physical space. The students requested more frequent and faster feedback as a way to help them stay connected with the class, as well as professor involvement throughout the course. The opportunity to interact with other students throughout the course was also mentioned as a way to foster engagement, which could include both group projects and assignments, as well as discussion board posts.

Over 70% of students "agreed" or "strongly agreed" with the statement, *I like the variety of learning experiences I had in this class.* Three strategies employed have received consistently high reviews from students: the use of virtual teams, class chats, and discussion boards.

In several of the classes surveyed for this study, students were put into virtual teams for the duration of the semester. Using various videoconferencing and chat technologies, students were able to meet virtually synchronously, and work together asynchronously in order to complete assignments or projects. Though there are sometimes challenges with meeting synchronously in online classes (e.g. various work schedules, students located in various times zones, etc.), many students found the experience helpful and enjoyed getting to meet other students virtually. This can help with the sense of isolation online students sometimes feel. Virtual teams were used to imitate class discussions, as well as to provide students the opportunities to work with others in their online class.

One of the authors uses class chats as a way to foster engagement in online classes, and has received positive reviews from students. Students are required to attend three out of five scheduled class chats during the semester. Using the learning management system's chat feature, the students and instructor are able to see each other (if a webcam is turned on), talk, type, and share screens. Most students only use the chat feature as opposed to talking, but the option is there if they wish to participate in that way. These class chats are an opportunity to discuss class

topics, address questions or concerns students may have, and foster a sense of community among the students. Class chats are typically recorded and then posted, along with the instructor's summary of the meeting, for those who were not present. When asked about how online classes can engage students, several respondents indicated chats as a viable option to implement.

Similar to chats but asynchronous in nature is the use of discussion boards in online classes. When this strategy is used, the instructor typically puts students in small groups to answer predetermined discussion questions. By breaking the class down into smaller groups, this prevents responses from getting lost in the crowd, and allows students to share insights and opinions with a smaller number of classmates. Back and forth dialogue is more likely to occur in such a setting. The benefit of discussion board posts is that students can post anytime/anywhere, as opposed to coordinating schedules to facilitate synchronous meetings. However, some of the dialogue can be lost in discussion board posts and the course-related conversation can be more challenging than when discussing topics face-to-face, whether in class or virtually through videoconferencing.

Limitations and Future Research

The inclusion of students from only three instructors' courses is a limitation to this study. In addition, the use of only business students limits the generalizability of the findings. Future research is needed to explore faculty perceptions of elements that should be included in online classes in order to better engage students. In addition, research on the type of professional development, if any, that supports the development and implementation of online courses could provide insight into the styles of classes instructors are encouraged to create, as well as provide suggestions for how to better train future online instructors. Technology changes rapidly and instructors should keep abreast of new developments in order to better reach today's online

student. The diversity that is often inherent in online classes serves as fertile research ground as well, as it can be speculated that the needs of first-time freshmen who recently graduated from high school could be different than those of working professionals who are returning to college to complete their degree.

Conclusion

Based on this study of 52 respondents, suggestions were provided to encourage engagement in online classes. By going to the source and asking students their perception on online class engagement, instructors are better able to understand the types of course activities the students find meaningful, as well as those they view as busy work. In addition, a better understanding of the motivations behind online enrollment was gained, as well as the students' view on the benefits and challenges of completing courses online. Given the prevalence of students in this sample who have taken multiple online classes, this survey provides a broad view of distance education, as opposed to a narrow focus on the practices of one or two instructors.

At times, instructors choose not to implement student suggestions due to varying opinions or preferences, as well as the bigger picture the instructor has in mind for the course. While not all of the students' suggestions can or should be implemented all at once, they provide concepts worth considering. It is possible that these suggestions and ideas could enrich online classes and provide the students a more engaging online class experience.

By asking students about their distance learning experiences, an understanding was gained regarding what elements successfully engage online students from the perspective of the students themselves. In addition, by focusing on the needs of the students, we hope to increase their level of engagement and reduce attrition as a result. The internet has created learning possibilities that did not exist a decade ago. Technology should be utilized to assist in the

learning process. By better engaging online students, higher education opportunities are extended to a subset of the population that was previously underserved – those with life demands that prohibit them from attending class in the traditional face-to-face format. Engaging online students is critical to the success of distance education.

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A Preliminary Study: Development of Intercultural Communication Competence Awareness in the Teaching of Business Communication at a Rural U.S. University through Learner-Generated YouTube Videos

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Abstract

This study is a preliminary introduction of a pedagogical approach to develop Intercultural Communication Competence (ICC) awareness in business majors including U.S., Korean, and Chinese nationalities through a business communication course at a rural Midwestern U.S. university by means of learner-generated YouTube videos. Anecdotal data found that collaborative cross cultural team activities and the creation of YouTube videos were instrumental in developing appropriate and effective behavior to adapt to new contexts and environments resulting in developing ICC awareness.

KEY WORDS: Intercultural Communication Competence, learner-generated You Tube videos, cross-cultural teams, cultural differences, rural values

Introduction

Information and communication technology continues to advance at an unimaginable speed "resulting in significant shifts in attitudes and behaviour" (Watson, 2010). These shifts necessitate not only adjusting to effective modes of communication and interconnectedness, but also Intercultural Communication Competence (ICC) since "People in different countries react to inputs differently, communicate differently, and make decisions differently" (Meyer, 2015, p. 68).

The challenge for today's businesses is not only about making continual adjustments to keep up with the demands of the global economy and with the pressure of interconnectedness to sustain their existence, but also to find "new and better ways of doing things" which is defined as "technology" according to Thiel (2014, p. 8). Thiel also argues that "no one can predict the future exactly, but we know two things: it's going to be different, and it must be rooted in today's world" (p. 6).

These different changes "rooted in today's" world require that ICC be placed on the top of the business priority list. In reality, ICC is not only critical for a globalized workforce, but also mandatory for those who seek to thrive in an interconnected world.

Today's technology offers new opportunities to challenge business majors in innovative ways that have never been previously considered. With an unpredictable future based on technology, all business schools, urban and rural, must continually adjust their curriculum and methodology to better prepare their students for a highly competitive and demanding job market "rooted in today's world." Today's world is "preparing learners for employment opportunities which do not yet exist, using digital tools not yet invented" (Ward, 2013, p. 8).

Administrators and academia, too, strive for ground-breaking ways of doing things. Faculty "should actively explore innovative approaches to curriculum and coursework design so that global competence becomes an integrated part of students' overall learning experience" (Yulong, 2013, p. 138).

Regarding rural higher education business majors, web based technologies now enable students to expand perspectives and opportunities to discover global connections as never before. Through these technologies, students are now able to reach out to locations that have only existed in textbooks or have, perhaps, been made possible by incoming international visitors.

The purpose of this paper is to present a preliminary introduction of a pedagogical approach to develop the ICC awareness of a total of 61 business majors, U.S., Korean, and Chinese nationalities, in a third and fourth year business communication course at a rural Midwestern U.S. university by means of learner-generated YouTube videos. This activity demonstrates how students can develop ICC described "very broadly as an impression that behavior is appropriate and effective in a given context" (Spitzberg, 2000, p. 379) or "the degree to which you effectively adapt your verbal and non-verbal messages to the appropriate cultural context" (Kiss, 2008, p. 437).

By developing learner-generated YouTube videos, anecdotal data suggested that students who interacted through a class project with different nationalities shared "appropriate and affective behaviors" (Spitzberg, 2000, p. 379). These interactions resulted in students developing ICC awareness. Further research in the form of pre and post-activity surveys will strengthen the underlying theory that collaborative cross cultural team activities and the creation of YouTube videos are instrumental in developing the ICC awareness of students.

Review of Literature

There was no apparent literature directly concerning the use of learner-generated YouTube videos with the purpose of developing ICC awareness within the context of teaching business communication in rural institutions of higher education. However, the literature on the following five areas proved to be useful in the understanding of the cross cultural student-centered team projects to create YouTube videos: 1) ICC and the Competency Framework; 2) the value of cross cultural awareness; 3) cultural understanding through high context and low context; 4) the instructional use of videos; and 5) rural American cultural values.

ICC and the Competency Framework

Regarding the first area in the review of literature, according to the University of Warwick *Competency Framework for Effective Intercultural Interaction* (2012), intercultural competencies can be grouped into four interrelated clusters, according to the aspect of competence they affect or relate to: Knowledge and Ideas, Communication, Relationships, Personal Qualities and Dispositions. This framework provides an organized and efficient approach to understanding ICC. Failure to understand these cultural differences can lead to stereotypes, misunderstandings, insulting behaviors and the mistreating of people from other cultures (McCrae, 2001).

The researchers used the *Competency Framework for Effective Intercultural Interaction* (University of Warwick, 2012), and adapted the aforementioned framework clusters to the needs of the U.S., Korean, and Chinese students as students created YouTube videos. The cluster, *knowledge and ideas* involved collection of new information through the asking of explicit questions, which generated new ways of thinking that challenge cultural assumptions and synergetic solutions requiring an integration of a range of points of view. The cluster, *communication* required the management of communication challenges, active listening, and sharing of contextual information. The cluster, *relationships*, was defined as having an interest in people with differing experiences and backgrounds and differing role relationships. In addition, the cluster, *personal qualities and dispositions*, related to self-awareness, acceptance of differing world views and flexibility.

Song and Kwon (2012) studied the aforementioned *relationships* cluster, and the relationship between personality traits and information competency in 245 Korean and 185 American students. Results of the surveys led Song and Kwon to conclude that, "conscientiousness and openness to experience significantly predicted information competency

in both Korean and American students. However, the influence of extraversion was significant only for American students" (p. 1153). Song and Kwon speculated that, "this result may be because of the high value placed on extraversion in American culture" (p. 1153).

The Value of Cross Cultural Awareness

Research indicates that contact with other cultures increases understanding and decreases negative stereotyping.

Perceptions become more accurate with increased intercultural contact (Jussim, 2005). In addition, according to McCauley (1995), "stereotypes are likely to be exaggerations of whatever real differences may exist between groups" (p. 215), and that contact reduces these stereotypes. The findings of a study on stereotyping between Americans and Greeks concluded that both Americans and Greeks who came into contact had more positive stereotypes than those who did not (Triandis & Vassiliou, 1967). As argued by Williams and Johnson (2011), "while studies suggest friendships with host country nationals are important for a successful experience, forming friendships with U.S. American students is challenging and rare" (p. 41), and concluded that "students with international friendships had higher scores on open-mindedness and lower scores on intercultural communication apprehension" (p. 48).

Moreover, regarding promoting cross cultural awareness, Abrams (2002), based on interviews, concluded that Internet-based culture projects promoted learners' acquisition of new cultures. Evidence also indicated that providing Chinese and American students with virtual collaborative opportunities would increase "student global competence in an easy to use and cost effective way" (Yulong, 2013, p. 127). The findings demonstrated that while U.S. university students in general had significantly lower performance scores in global knowledge and attitude, "easy-to-use interventions can effectively develop student global competence" (Yulong, p.125).

Furthermore, "if our students are expected to understand and resolve these global issues, it becomes crucial for educators to address parochialism and to cultivate student global competence" (Yulong, p. 125).

The role of cultural understanding and foreign language learning was also studied. Ortuno (1991) argued that students can acquire cross-cultural awareness by providing them "with the tools for identifying their own cultural value orientations as well as those of others" (p. 449).

Cultural Understanding through High Context and Low Context Cultures

As indicated in Table 1, *A Comparison of High and Low Context Cultures,* based on the research of Kim, Pan and Park (1998), Chinese, Korean and American cultures were compared and it was concluded that the "Chinese and Korean subjects are shown to exhibit tendencies that are consistent with Hall's description of high-context (HC) cultures, and the American subjects are shown to exhibit tendencies that are consistent with low-context (LC) cultures" (p. 507).

Following the original work by Hall (1976), a continuum is posited in five areas: 1) social orientation; 2) commitment; 3) responsibility; 4) confrontation; and 5) communication. As Table 1 indicates there are significant differences that could impact collaboration between U.S., Korean and Chinese students. Kim, et al., (1998) concluded that "compared to the American subjects, the Korean and Chinese subjects seem to have more difficulty thinking in new and unfamiliar situations, and feel that things are changing too fast" (p. 521). High context "people appear to be more socially oriented, less confrontational, and more complacent with existing ways of living" (p. 521).

Table 1

A Comparison of High and Low Context Cultures

Area	High Context Cultures (Korean and Chinese)	Low Context Cultures (U.S.)
Social Orientation	People are intensely involved with one another.	Bonds that tie people together can be fragile. People may move away or withdraw if situations do not favorably develop.
Commitment	Commitment to complete action is strong. A person's word is a bond there is an expectation to do as one says. Commitment of often serves as the beginning of a lifelong relationship.	People do not generally feel as bound to complete promised actions.
Responsibility	Individuals in places of authority Are personally responsible for the actions of subordinates.	Responsibility is diffused and can be difficult to determine. Individuals resist self-examination and accountability.
Confrontation	Social harmony and personal bonds lead to the avoidance of direct confrontation.	Less likely to avoid direct and open confrontation. Expresses opinion to defend oneself. More direct criticism and willing to state criticism for the record.
Communication	Less information is contained In the verbal part of the message such as in words, sentences, and grammar. Understanding requires messages in the appropriate context.	Information is found in direct explicit code in the words, sentences, and grammar. What is important, is what is said, now how it is said.

Note. Source from Kim, Pan, & Park, 1998.

The Instructional Use of Videos

Regarding the second area relevant to this study, the instructional use of videos, much literature exists on faculty-generated YouTube videos, especially in light of the flipped classroom movement. There is a limited amount of literature currently available on learner-generated videos.

Three types of assignments for the instructional use of videos are described by Sherer and Shea (2011): Listening and writing about current YouTube uploads; collecting and archiving existing YouTube videos; and student production of video podcasts uploaded to wikis, a web site or YouTube. Furthermore, Kelsen (2009) reported on the use of YouTube as supplementary learning materials in Teaching English as a Foreign Language (TEFL) in Taiwan and concluded that, "some students highlighted the importance of providing clear explanations regarding how to use this learning tool effectively" (p. 1). In addition to using videos in TEFL, videos have also been utilized to teach other languages. Ludewig (2001) reported on the use of student-generated iMoves in the teaching of German: "All of the above make the iMovie project learner-centered and divert the control over the material from the teacher to the learner who must actively construct their learning around the given task" (p. 12).

In addition to teaching foreign languages, You Tube has been utilized to teach chemistry. Benedict and Pence (2012) focused on the use of student-created videos in the teaching of chemistry: "Students were given a week to find time to go into a prepared laboratory, videotape an instrument or performing s titration, edit the video, and then upload it to YouTube" (p. 493). The authors combined their study with the use of smart phones and barcodes on worksheets: "When a barcode (Quick Response Code or QR code) is added to a piece of paper, the paper

becomes a smart object, which is clickable as a web page when viewed with a smartphone" (Benedict & Pence, p. 494).

In describing classroom use, Frydenberg (2006) reported on students creating video podcasts to teach course topics to peers:

> Earlier podcasts that they created showed students sitting in their dorm rooms facing a particular topic or summarizing steps for a procedure that they learned in class on their particular day. As the semester progressed, students engaged in moments of discovery as they viewed the podcasts that their classmates had created. Often their classmates work served as examples to refine and improve their own processes for creating video podcasts. (p. 5)

Digital story telling tasks are also a "valuable, transformative tool for learning in a range of curriculum and discipline contexts" (Kearney & Schuck, 2006, p. 29). The use of digital storytelling has also been discussed in other fields: "Artists and businesspeople are examining the effects of digital storytelling on their practices, yet teacher educators have not made as many inquiries into the possible effects of digital storytelling" (Tendero, 2006, p. 175). Tendero continues to argue that "digital storytelling efficiently facilitates efforts to capture classroom moments for pre-service teachers to reflect upon and revise practice, as well as to develop a teaching consciousness" (p. 175).

Rural American Cultural Values

Georgetown University Child Development Center for Child Health and Mental Health Policy University Affiliated Program, National Center for Cultural Competence (2000) defines culture as an:

"integrated pattern of human behavior that includes thoughts, communications, languages, practices, beliefs, values, customs, courtesies, rituals, manners of interacting and roles, relationships and expected behaviors of a racial, ethnic, religious or social group; and the ability to transmit the above to succeeding generations." (p.1)

Research indicates that there are significant differences between U.S. urban and U.S. rural culture and values. Schwartz (1992) defines values as "principles that guide our lives" (p.1), and Doran and Littrell (2012) describe values as "designed to lead us towards our ideal world, transcend specific situations, guide selection or evaluation of behavior and events, and each individual and society orders them by relative importance" (p 265).

A field research study by Doran and Littrell (2012) found significant value priority differences between urban and rural residents. The researchers concluded that "rural residents tend to be more individualistic and conforming (conforming to individualism as a norm), conservative, traditional and security-oriented" (p, 276). Other findings indicated that urban residents were "significantly higher for universalism and significantly lower for conformity and security. Rural residents are significantly higher for tradition" (p. 276).

The Pedagogical Approach to Develop Intercultural Communication Competence Awareness

The purpose of this preliminary study was to develop the ICC awareness of a total of 61 students including U.S., Korean, and Chinese nationalities in a third and fourth year business communication course at a rural Midwestern U.S. university by means of learner-generated YouTube videos. In this study the definition of urban and rural counties in this state was based on the Office of Management and Budget (2014) categorization. Furthermore, based on

hometown county categorization the student population on this campus was overwhelmingly rural. Student enrollment from rural counties for 2005 to 2014 ranged from 3,758 to 3091. During the same period, student enrollment from urban counties ranged from 322 to 621. The economic base of the small towns in the state under study was primarily agricultural. It is common that students pass through their elementary and secondary school systems with the same cohort group. Within this atmosphere it would be rare to meet a non-U.S. citizen. A typical student's first potential opportunity to meet a non-American is at the university level.

The number of on campus first generation college students for 2009 to 2014 where both parents have a high school degree or less, ranged from 460 to 556. The number of students where one parent or both held a college experience, but no bachelor degree, ranged from 923 to 1,150. Moreover, the number of students with one or both parents holding a bachelor degree or higher ranged from 1,096 to 1,150. Thus the university student body was categorized as overwhelmingly rural. Moreover, a significant number of these students were the first generation of students enrolled in college.

According to the U.S. Census Bureau (2014) figures there has been an influx of immigrants in the state in question, working primarily in the meat packing industry in the southwestern part of the state. The number of Hispanics rose by 59 percent since the 2000 census (Kulcsar, 2011). As Kulcsar argues most of the increase was in three urban areas, and "more residents will likely move away from the state's rural areas if current trends continue" (p. 1). Based on the recent U.S. Census Bureau data, the state's population is 2,894,000, with a Hispanic or Latino population of 11.2 percent.

The activity of this preliminary study was conducted over three semesters, and each time the activity was adjusted based on the researchers' own After Action Review. This paper intends

to open a dialog on the topic by presenting an instructional process that can be utilized on any university campus with an international student population.

In this study, students collaborated in teams of three to five and each team created one five to eight minute video related to issues the students themselves selected. Self-selected topics ranged from transportation in a small town to life in dormitories, living off campus, student clubs, use of library services, and effective study skills. Students filmed the videos out of class. However, in class media training was provided by a university media technology specialist, and support materials were uploaded and made available on the class learning management system, Blackboard. Prior to beginning the activity, students populated a Google spreadsheet concerning their technical skills so that the media technologist could design technical training based on their needs. The media technology specialist conducted in class workshops, and guided students on how to film with their smart phones, or video cameras made available by the university. The majority of teams used smart phones. The workshops focused on: 1) storyboarding; 2) recording sound; 3) proper angles to hold the smart phones or video cameras; 4) how to transfer the video from smart phones or cameras to a laptop; and 5) how to insert and cite photographs and music from Creative Commons (2014) in order to avoid copyright infringement. Of the 61 students, 50 used PCs and 11 used Macs, impacting the video software they used. Mac users worked with iMovie and PC users worked with Windows Moviemaker Live. In addition, each team had at least one student who had used iMovie or Windows Moviemaker Live prior to this business communication class.

A number of issues emerged from the video creation processes that resulted in significant team editing. Some teams failed to follow copyright instructions. In addition, students failed to cite photographs they themselves took and included in the video.

The organization of the videos varied. Some used a series of narrated photographs. One team recorded a skit to show the differences between classrooms in the U.S. and Korea. Another team filmed a soccer team engaged in academic study after a Chinese informant said that U.S. student participation in sports was much higher than in China. Another team took viewers into a Chinese student apartment (a friend of a Chinese team mate filmed in China and emailed the video), and then into an apartment of a U.S. student living off campus. Students noted similarities and differences in life styles. One team with Korean students narrated the video in Korean, with English subtitles, while several teams with Chinese students narrated in Chinese with English subtitles. In both of these cases, the translation from Chinese or Korean into English was weak and caused re-work. Several teams took viewers into large urban areas in China and Korea. These scenes were contrasted with U.S. student scenes from their rural hometowns.

In class, student teams then presented an After Action Review, supported by viewing the video and a slide pack or Prezi, to the class on the project covering three questions: 1) what did they think would happen when they began the project?; 2) what actually happened?; and 3) what did they learn? The media specialist attended the presentations and provided immediate feedback on student products. In addition, a representative from the university Office of Strategic Management attended and provided feedback on the content. Upon completion of the project, the university Office of Strategic Management placed selected videos for Chinese viewers on the university YouKu site as You Tube is blocked in China. In addition, the same office placed selected videos for Korean viewers on the university YouTube site.

Relationship of the Review of Literature to the Pedagogy

The pedagogy utilized in this activity was based on the review of literature as summarized in Table 2. Much of the shared information represented new ways of thinking and the creation of the video format required synergetic solutions. Team communication required an efficient management process as the vast majority of U.S. students worked part time. Language differences required active listening on everyone's part, with repeating back the message to confirm understanding, a key communication tool. Anecdotal evidence revealed that students became aware, many for the first time, that stereotypes and misinformation could exist. While there were international students on campus, many U.S. students reported to the researchers that they had never collaborated with international students on a class team project. Students were provided significant technical training. To address issues in high context and low context societies, one researcher provided a direct lecture and class discussion on the topic using Table 2. In addition, because the researcher had lived and worked in high context cultures, personal examples and stories were shared. Finally, Chinese and Korean students were exposed to rural attitudes and small town life styles as U.S. students were exposed to Korean and Chinese urban lifestyles.

Table 2

A Summary of the Related Literature Utilized in the Pedagogy

Review of Literature	Pedagogical Application
Knowledge and Ideas	Information gathering, new thinking, synergetic solutions
Communication	Communication management, active listening, building of shared knowledge, language barriers
Personal Qualities and Dispositions	Self awareness, flexibility
Relationships	Welcoming of strangers and sensitivity
The Value of Cross Cultural Awareness	Reduction of stereotypes
High and Low Context Cultures	Explicit faculty led lecture/discussion on the differences with "real-life" examples
Student-generated videos	Technical training and lessons learned
Rural American Cultural Values	Small town encounters urban international students

Conclusion and Implications

This preliminary study opened a dialog on a sparsely researched topic in teaching business communication and developing ICC awareness at a rural university level. The pedagogical purposes of the described learner-generated video project were to: a) develop ICC awareness and raise the cultural awareness of all students in the course including U.S., Chinese and Korean; b) provide experience in multicultural teams; and c) introduce opportunities to expand on existing technical skills.

By gaining insight into cultural differences through a learner-generated video, students not only became more aware of their similarities and differences but were also able to understand

each other's values and traditions and communicated more effectively than before the project completion.

Furthermore, these goals were consistent with the business needs of the current and future workforce including cross cultural team work and the ability to use technology to span geographical distances.

In conclusion, as stated by Thiel (2014), "college students become extremely skilled in a few specialties, but many never learn what to do with those skills in the wider world" (p.3). If we are to prepare business students to meet future challenges for employment opportunities that do not yet exist and use digital tools that have not yet been invented (Ward, 2013), it becomes our obligation to "help students see beyond the tracks laid down by academic specialties to the broader future that is theirs to create" (Thiel, p. 3). Students must not only develop ICC awareness in order to collaborate, virtually or face-to-face, but also be able to apply these competencies in a "wider world."

Recommended Future Research

In concluding this preliminary study, the researchers recommend the following studies:

1. This pedagogical approach should be replicated with qualitative and quantitative surveys focused on: a) the clusters identified in ICC; b) perception of the value of cross cultural awareness; and c) rural student perceptions of cross cultural encounters.

2. Longitudinal follow up surveys with team participants are suggested as a way to determine the lasting effects or real world applicability of the lessons learned in team projects.

3. Participants in cross cultural team presentations can be surveyed to determine any shifts in attitudes towards ICC clusters.

4. Pre and post activity surveys can be administered to determine the degree of collaboration between low context and high context cultures.

5. Further studies using other Web 2.0 technologies to develop ICC awareness can be developed.

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An Evaluation of a Digital Forensics Bridge Program for Promoting STEM Participation

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Rebekah Feng, President of Becks Intelligence Group

Abstract

The University of Central Oklahoma (UCO) received three-year funding from Oklahoma States Regents of Higher Education (OSRHE) to implement an innovative digital forensics/STEM program, and host an annual Crime Scene Investigation (CSI) Summer Academy. The bridge program was based on a Government-Industry-University (GIU) model which linked research, K-12 education, informal learning, job shadowing, mentoring, career exploration, college matriculation, and professional development for teachers to provide a multi-tier intervention to high school student participants. The paper presented a one-year program evaluation of the 2015 CSI Summer Academy which served 35 high school students with experiential learning and career-exploration opportunities. The CSI Program immersed student participants in inquiry-based learning using a forensic science lens. Students participated in a Mathematics Track through crime scene investigation activities, Science Track through DNA testing activities, a Technology Track through exposures to simulation scenarios, and an Engineering Track through the exploration of physics using evidence recovery. These activities were designed to foster 21st century skills of critical thinking, problem solving, team collaboration, and technological competency. The CSI Program also provided six high school teachers with professional development throughout the grant period to increase the awareness and interest of high school students in STEM fields through the development of age-appropriate curricula. Finally, the CSI program engaged 12 professionals in mentoring the student and teacher participants. Professionals represented partnering institutions from the IT industry, informal STEM learning centers, and law-enforcement agencies at the city (Edmond Police), state (Oklahoma State Bureau of Investigation), and federal levels (FBI).

Keywords: Innovation, Digital Native, Job Shadowing, Model, Simulation

INTRODUCTION

Research Background for an Emerging Profession

Digital forensics is an inter-discipline of forensics and criminal justice. To succeed as a digital forensics (DF) professionals requires knowledge of law enforcement, **s**cientific, **t**echnological, **e**ngineering, and mathematical (STEM) skills, and abilities to perform the collection, preservation, examination, and documentation of legal evidence. Digital forensics is becoming an indispensable tool for law enforcement to solve modern-day crimes such as hacking, security breaches, identify theft, or homicide in a digital society (Nelson, Phillips, Enfinger, & Steuart, 2010). According to the Department of Labor, DF is now ranked as one of the top ten professions with an annual growth rate of 34% in the nation (U.S. Department of Labor, n.d.). Likewise, there is a rising demand for DF professionals in Oklahoma with an expected growth rate of 39% for the next five years (Oklahoma Employment Security Commission, 2015).

Problem Statement & Need for a Bridge Program

While the job openings for forensic professionals in Oklahoma are projected to be 190 a year for the next five years, only 94 forensics degrees were conferred in 2014 (Oklahoma State Regents of Higher Education). Current K-12 curricula and the education's technology infrastructure have created several constraints that might have contributed to the shortage of individuals with forensics career interests. First, the emerging forensics profession has an interdisciplinary nature that requires STEM skills. Unfortunately, STEM participation in Oklahoma is historically low in comparison with national averages (Oklahoma State Regents of Higher Education). Next, *Cyber Security,* which is part of K-12 curricula, is currently offered as a half-unit, elective course in only a few Oklahoma high schools. This course is often taught with lectures in a traditional face-to-face classroom environment instead of a hands-on approach in a modern-day forensic lab due to resource and fiscal constraints, thus limiting the effectiveness of instruction. These constraints discourage Oklahoma youth from exploring college

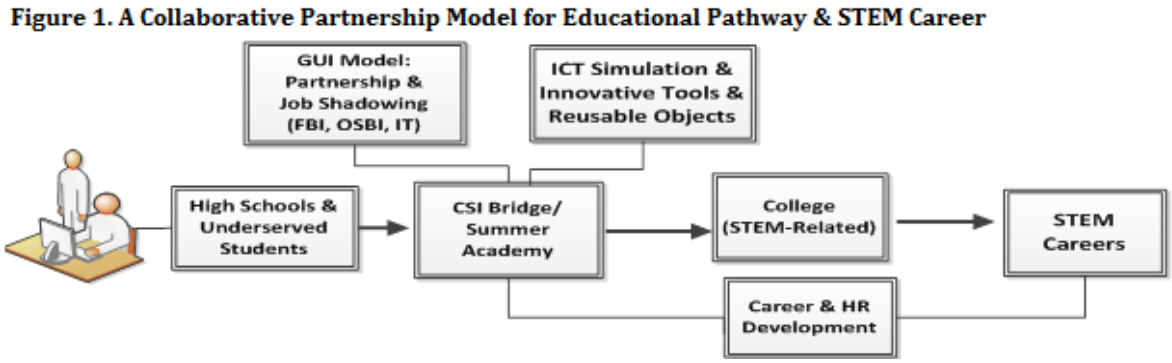
resources and the immense forensics career opportunities available (National Research Council. (2012).

To close the gap between the supply and demand for DF professionals, the Department of Information Systems Operations Management (ISOM) partnered with the Forensics Science Institute at UCO to offer double majors starting in fall 2015. In addition, a summer bridge program was proposed to promote early career awareness and interests in STEM/DF disciplines among high school students,

A Collaborative Partnership Model for the CSI Summer Bridge Program

A Crime Scene Investigation (CSI) Summer Academy (referred to as the CSI Academy hereafter) was funded by the Oklahoma State Regents for Higher Education (OSRHE) over the 2013-2015 period. The CSI Academy was based on a collaborative government-industry-university (GIU) model. The GIU model fostered collaboration among five law-enforcement entities: Oklahoma State Bureau of Investigation (OSBI), Oklahoma Information Fusion Center, Edmond Police, the Criminal Justice Department and the Forensic Science Institute, as well as the Center for eLearning & Customized Education at UCO. The GIU model also provided Oklahoma educators, researchers, and high school students with access to modern-day labs, cutting-edge technology, and opportunities to interact with STEM/DF professionals. The synergized partnership also allowed forensics professionals, educators, and researchers to maximize resources, extend technological infrastructures, provide venues for career exploration, and educational pathway (Figure1).

Figure 1. A Collaborative Partnership Model for Promoting STEM Education-Career Pathway



Programming of the 2015 CSI Academy

The CSI bridge program offered a five-day residential Academy which incorporated contexts of criminal justice and forensics programming. The bridge program incorporated various job-shadowing venues and hands-on activities (Table 1), that included but were not limited to hands-on activities, field trips, interactions with digital forensics (DF) professionals, and role playing in simulated detective offices. Participants were immersed to role play as law-enforcement officers or DF examiner to solve modern crimes. See Appendix A for detailed schedules of the CSI Summer Academy.

Table 1. ***Job-Shadowing Categories of the 2015 CSI Summer Academy***

Day#	Career Research	Hands-on & Team Collaboration (SIM & F2F)	Field Trips & Professional Interactions	Speakers & Professional Interactions	College Planning & Resources
Day1		3		1	
Day2	3	3	3		2
Day3	2	3		1	
Day4	1	4	7	1	2
Day5	1	8	1	1	1
Day6		1			1
Total	7 H	22 hours (H)	11 H	4 H	6 H

Purpose Statement & Program Objectives

The overarching goal of the multiyear collaborative government-industry-university model (GIU) project was to promote STEM/DF participation. The 2015 CSI Academy focused on four

program objectives as shown in Table 2. Job-shadowing venues were designed to promote STEM career awareness, interests, and college aspiration.

Table 2. ***2015 Bridge Program Objectives & Supporting Activities***

Program Objectives
1. Promote career awareness & interests
2. Promote College Aspiration & Planning Resources
3. Foster Student Confidence in the Pursuit of STEM Opportunities
4. Ensure Satisfaction with the CSI Bridge Program

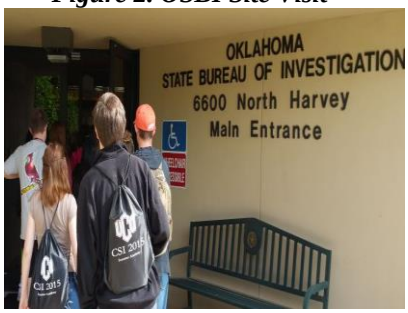
Literature Review, Theoretical Frameworks, & Programming of the CSI Academy

Educators across the nation assert that critical problem solving, innovation skills, information social media, technology skills, life-long learning, and career skills must be fully realized in order to better prepare college students for their successful participation in the highly competitive global economy (Dede, 2011; Franklin, 2011; Siberman, 2007; Springer International Handbook of IT, 2011). Engaging students in active learning can foster the construction of knowledge, and develop skills of critical thinking, communication, collaboration, and creativity. Doing so can better prepare today's digital learners to participate in the future workforce successfully (National Research Council, 2012). Thus, the CSI Academy, which was designed as a bridge-way between high schools and colleges, was based on the following theoretical frameworks

I. Job shadowing

Job-shadowing activities included site visits at the physical location of the Oklahoma State Bureau of Investigation (OSBI), as shown in Figure 2. FBI agents also shared with CSI Academy attendees how the *FBI Evidence Response Team* processed crime scenes and solved crimes. Other hands-on

Figure 2. OSBI Site Visit



activities included a DNA presentation by one Forensics professor who also works in OSBI. CSI Academy attendees also performed blood testing in a forensics lab.

II. Critical Thinking Skills for Solving Modern-day Crimes

Creating effective learning modules to promote critical problem solving skills requires trial and refinement, ideally conducted in the range of contexts where they will be used to maximize ecological validity (Tuzun et al., 2009). Further, transformative learning can only occur when students are immersed in authentic learning environments with contextual real-world scenarios. These "authentic" learning environments provided high school students with project-based, role-playing, and hands-on approaches to acquire inter-disciplinary knowledge and critical problem-solving skills during their attendance at the CSI Summer Academy.

The Academy also featured an innovative and experiential learning experience using a crime scene investigation (CSI) simulation by incorporating modern-day crimes and real-life scenarios. The Academy started the program with a 911 phone call (Figure 3) by a female college student who reported a burglary in her residence, in which the report entailed her credit cards being stolen. As the week progressed, CSI Academy participants were engaged in problem solving to recover more evidence as they processed a crime scene (Figure 4), and dusted for finger prints (Figure 5).

Figure 3. A Virtual 911 Center	***Figure 4. A Crime Scene***	***Figure 5. Finger Prints***
		

III. Communication Skills for Immersing in Simulation

Simulated technologies can provide higher education a cost-effective venue for exploring, creating, and reusing permanent learning objects when they are too expensive or impossible to

achieve in traditional classroom settings (*Crellin & Karatzpimo, 2010).* Three-dimensional (3-D) virtual environments allow learners to collaborate in a simulated "real-world" setting, engage learners in problem solving, and enrich learning experiences (*Bell, 2011*). Table 3 presents projects which were funded by the National Science Foundation (NSF) to incorporate 3D simulation and promote student interests in learning science, technology, mathematics, and engineering (STEM). The integration of online 3-D multi-user virtual learning environments can engage students in solving "real-world" problems, encourage social interactions, and promote collaboration between participants.

Table 3. ***Using 3D Simulation to Promote Career Interests in STEM Fields***

Institute	Project Description	Reference
Harvard University	NSF: A Virtual River City for K-12 students	Allen & Seaman, 2011
Ohio University	NSF: Virtual science lab simulations	Schiller, 2011
Dartmouth University	A virtual community emergency responders	Manlow et al, 2010
EDUCAUSE	Simulated learning environments	Dede, 2011

To foster authentic learning, the CSI Academy was designed with virtual simulation which immersed Academy participants in role playing as detectives and law-enforcement professionals. CSI Academy participants used avatars to conduct virtual interviews in simulated (SIM) police offices. Attendees worked in four teams using SIM to solve crimes. Each team interviewed witnesses and suspects in a virtual police office (Figure 6). CSI attendees used avatars to role play crime-fighting officers (Figure 7), while team leaders' role played as witnesses and suspects (Figure 8). Simulated technologies allowed students to have real-life experience requesting a search warrant and making an arrest.

Figure 6. A Virtual Police Office

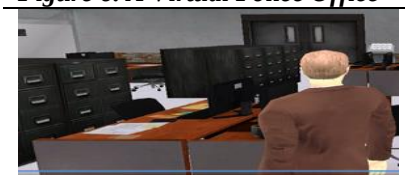


Figure 7. A Virtual Interview Room

Figure 8. Interviewed a Suspect

IV. Collaboration – Team & Social Construction of Knowledge

Immersive simulation can offer opportunities to be on the frontier of academic research and social learning. The philosophy underpinning the use of simulated learning environments in education is that knowledge creation is a collaborative rather than an individual pursuit and that there is not a correct, definitive or single pathway to knowledge (Lent & Brown, 1994). Transformation of information into knowledge is also based on sharing the construction of knowledge as part of the learning process, that is, a social construction of knowledge (Manlow, Friedman, & Friedman, 2010). Furthermore, the collaborative experience allows students to engage deeply due to the presence of individual student avatars.

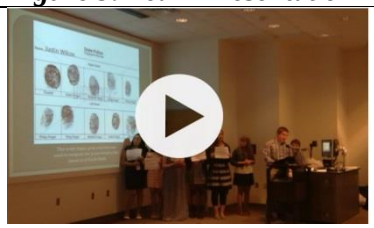
An important aspect of the CSI bridge program is that it offers information about how to conduct job-shadowing in a virtual environment. This potentially opens new possibilities for students to experience previously "difficult-to-access" fields of study. Moreover, these simulated learning environments emphasize the social and temporal aspects of communication processes in team interaction. Effective implementation of a 3-D coordination mechanism in virtual teams can reduce conflict and social loafing because the visual space allows team members to "see" what others are doing (Bronack et al., 2008). Thus, CSI Academy attendees could focus on communicating critical task-related information to increase equitable contribution to a team project (Halse et al., 2011).

V. Creativities – Digital Presentations

Academy participants were encouraged to reflect on their learning journal throughout the Academy week by documenting daily how they applied critical thinking skills to uncover additional evidence, link the burglary incident to other murders in another university, and

collaborated with team members to solve a modern-day crime. Students were also encouraged to use mobile apps or innovative technologies to create digital presentations of their findings.

On the last day of the academy, each team presented their findings (Figure 9), and shared their learning journey with a panel of judges. The panel consisted of one Criminal Justice professor, one OSBI examiner, and one Edmond police officer. These panelists role-played as judges (Figure 10), as participants of teams shared how they solved the case and presented evidence. Another important factor for student development and future success is parental support. Parents were invited to attend team presentation and academy graduation. The auditorium was packed with family members and parents who were highly engaged (Figure 11).

Figure 9. Team Presentation	***Figure 10. Presentation Panel***	***Figure 11. Parental Support***
		

Methodology for Data Collection & Analyses

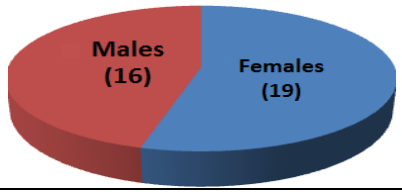
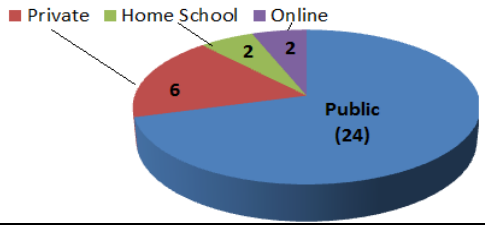
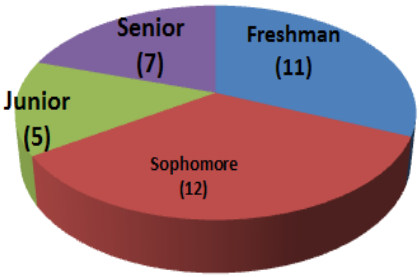
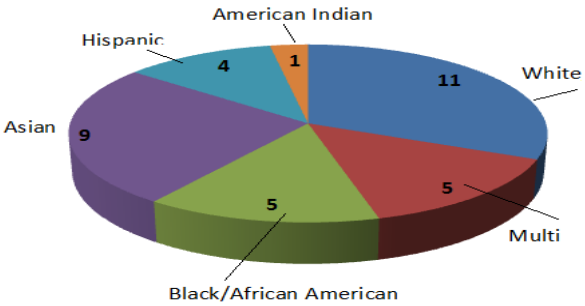
Instruments & Data Collection

The bridge program used the CSI-Survey (See Appendix B) to collect both quantitative and qualitative data. Quantitative data were derived from closed-ended questions that participants self-reported by selecting answers from any of the pre-defined Likert-type scales (i.e., *strongly disagree, disagree, undecided, agree, and strongly agree*). Qualitative data were derived from open-ended questions of the CSI-Survey. CSI Academy participants were administered with the CSI-Survey before attending and after completing the summer program.

Target Population & Sample Population

The target population included any high school students in grades 9-12 who were Oklahoma residents attending 256 high schools across the state of Oklahoma. School types could be public, private, online, and home schools. Each year, the sample population was set to 35 high school students by Oklahoma State Regents of Higher Education due to budget constraints. In 2015, 106 students applied and 35 were selected. See Table 3 for the demographics of the 2015 Cohort.

Table 3 ***Demographics of 2015 CSI Cohort***

Category	Sub Categories	Percent	Frequency Count (Not Percentage)
Gender	Females	54%	
	Males	46%	
School Type			
	Public	71%	
	Private	17%	
	Home School	6%	
	Online	6%	
Grade Level			
	Freshman	31%	
	Sophomore	34%	
	Junior	14%	
	Senior	20%	
Ethnicity			
	White/Caucasian	31%	
	Black/African American	14%	
	Multi	14%	
	Asian	26%	
	Hispanic	11%	
	American Indian	3%	

Discussion of One-Year (2015) Program Evaluation

The formative evaluation used the CSI survey to collect qualitative & quantitative data (Referred to as mixed data hereafter). Thirty five CSI Academy attendees were administered with the CSI Survey after completing the summer academy. The formative evaluation was guided by program objectives to promote career interests, college aspirations, and satisfaction with learning STEM and digital forensics. The formative evaluation entailed quantitative and qualitative analysis of mixed data.

I. Quantitative Analysis

The quantitative evaluation was based on CSI academy attendees' responses to closed-ended questions in the CSI survey. The survey used seven-point Likert Scales (*Strongly Agree, Agree, Somehow Agree, Neither Agree nor Disagree*, etc.). The evaluator performed a quantitative analysis by using frequency statistics to determine aggregated result if the CSI program met its stated objectives.

Program Objective #1: Promoting Career Awareness & Interests

Academy participants were engaged in hands-on activities, team collaboration, field trips, simulation, and professional interactions. Table 4 presents the effects of CSI program on participants' attitude, interest, and STEM career awareness at the aggregated level.

Table 4. ***Perceptions of STEM Interests & Career Awareness***

Excerpt of Survey Questions/Description	Positive	Neutral	Negative
Q4. I am aware of STEM career opportunities	100%	N/A	None
Q5. I enjoy learning STEM.	100%	N/A	None
Q6: I am interested in pursuing a STEM career.	95%	5%	None
Q7. I am aware of career opportunities specific to forensic science.	100%	N/A	None
Q10. I understand what professionals in forensic science do.	97%	3%	None
Q13. I gained a better understanding of how forensic science works.	95%	5%	None

Program Objective #2: Promoting College Aspiration & Planning Resources

To support the second program objective, Table 5 presents positive responses by the CSI participants, after being exposed to college planning and access to college planning and financial resources. Participants also learned about the Federal Pell Grant, Oklahoma State Promise, and scholarship opportunities at UCO.

Table 5. ***College Planning & Resources Awareness***

Excerpt of Survey Questions/Description	Positive	Neutral	Negative
Q17: I gained better understanding on the college application process.	95%	5%	None
Q18: I gained better understanding on scholarship and grants.	95%	5%	None

Program Objective #3: Fostering Student Confidence in the Pursuit of STEM Opportunities

To foster student confidence, the bridge program was strategically planned, implemented, and executed to bolster students' confidence by linking the CSI Academy experience with STEM curricula and other post-CSI activities. Table 6 presents students' perceived confidence as the result of attending the 2015 CSI Academy. See the section of *Post-CSI* section below for more opportunities which are designed to foster confidence by encouraging CSI attendees to present at science fairs or STEM conferences.

Table 6. ***Impacts of CSI Summer Academy on Student Confidence***

Questions to Assess Student Confidence	Positive	Neutral	Negative
Q8. I am confident and will in succeed in a science & technology field.	95%	5%	None
Q11. I feel confident in my abilities to understand science & technology.	95%	5%	None
Q19. I feel confident in presenting a poster at S & T fairs and conferences.	92%	8%	None

Program Objective #4: Program Satisfaction

The fourth objective was achieved by engaging students in hands-on activities which were discussed in prior sections. Table 7 shows that CSI Summer Academy participants were largely satisfied with the academy as indicated by frequency data culled from the CSI survey. Table 7

evidences that participants enjoyed the CSI Academy and would strongly recommend the Academy to their friend.

Table 7. Student Perceived Satisfaction towards 2015 CSI Summer Program

Questions to Assess Student Satisfaction	Positive	Neutral	Negativ e
Q17. I would recommend the CSI Summer Academy to my friends.	94%	6%	None
Q18. I am satisfied with my overall CSI Summer Academy experience.	94%	6%	None

II. Qualitative Analysis

The qualitative analysis methods include observation, hands-on cooperative learning experiences, field trips, and thematic analysis. The observation was based on an *Onsite Evaluation Rubrics* (Appendix C) which was provided by the Oklahoma State Regents of Higher Education (OSRHE). Further, a qualitative assessment of hands-on cooperative learning experiences, field trips, and job-shadowing activities were also performed (See Appendix D). The qualitative data were derived from participants' short answers to open-ended survey questions # 19 and 20 of the CSI Survey. Recurring themes were identified to gain deeper insights on how attendees were affected by the 2015 CSI Summer Academy and why attendees found the camp interesting and enjoyable. Table 8 outlines thematic analyses that the 2015 CSI Academy achieved its goals.

Table 8. Qualitative & Thematic Analysis of 2015 CSI Summer Academy

Program Objectives	Observation	Q# 19	Q#20	Remark
1. Promote career awareness & interests	Yes	Yes	Yes	See Appendices C, D, & E
2. Promote college aspirations	Yes	Yes	Yes	See Appendices C, D, & E
3. Promote confidence in STEM	Yes	Yes	Yes	See Appendices C, D, & E
4. Promote satisfaction ….	Yes	Yes	Yes	See Appendices C, D, & E

Holistic Evaluation & Personal Reflection

The mixed analyses are designed to measure how CSI attendees perceived the effectiveness of the CSI program. Overall, 2015 CSI participants found the CSI summer program fun, experiential, and educational. Appendix D presents attendees' rankings of their favorite activities including field trips, DNA testing, team collaboration, problem solving, and interactions with FBI

and forensics professionals. Below are excerpts from participants who shared their appreciation for the opportunity to attend the CSI Academy. See Appendix E for details.

"Thank you so much for providing students like myself the opportunity to learn more about forensics before getting into college. I will be going into STEM field and UCO is my number one choice of in-state colleges."

"*I appreciate the opportunity to be exposed to potential forensic careers. The knowledge I gained during this camp will be carried with me throughout my life and into my career"*

"Thank you for this opportunity to help us get a further understanding through this program. It was an amazing learning experience and great building block for helping us decides what path to go down in college."

Post-CSI Opportunities & STEM Career-Educational Pathway

Several post-CSI activities were designed to foster student confidence and pursuit in STEM. Former CSI academy participants have been and will be contacted for opportunities to present a poster at science fairs, Oklahoma Research Day, and the annual *Women & Minorities in STEM Conference* which is hosted annually by the Experimental Program to Stimulate Competitive Research (EPSCoR). These post-CSI academy activities were designed to help students integrate their CSI experience with high school Science & Technology curricula, and should help them continue to build confidence in these areas.

Scope, Limitations, & Future Study

This study has several limitations. First, the sample size was small and all participants came from the same state. Although the bridge program targeted high school students attending 256 high schools across the state of Oklahoma, the approved budget by the Regents for only 35 participants limits the sample size. Second, the study also employed convenience sampling by choosing from a pool of students who self-selected and applied for the summer academy. Third, the time span of the Academy was only one week.

Therefore, the scope, sample size, geographic boundary, and time constraints of the study hindered the researcher's ability to generalize the results to a larger population. Future studies with larger sample size should build on findings of this study to probe deeper how a bridge program affects student career awareness and interests. That said, given the overall dearth of underrepresented female and ethnic STEM professionals, bridge program like the CSI Summer Academy could prove to be an integral link to increasing diverse representation in the STEM workforce.

Leadership Implications, Broader Impacts, & Future Studies

Today's millennial generation, who grew up with immersive games, the Internet, and social networks, prefers learning through more interactive methods that are available to them anytime and anywhere. However, many traditional educational institutions still use text-based lectures as the primary method to delivering learning content. Educational institutions must join forces with the industry and government entities quickly to respond to changes that are upon educators in how, where, and why today's students learn. While emerging technologies may not address all educational challenges and will not replace all traditional teaching methods, the bridge program can continue to provide K-12 teachers and college professors a platform that provides educators with global access to emerging technologies, simulated learning environments, and effective e-learning resources.

This bridge program provided avenues for researchers to explore innovative teaching strategies, simulate authentic learning environments, create effective cyber-enabled learning resources, and improve technological infrastructure in order to better recruit today's students into the highly skilled and rewarding digital forensics and STEM profession. Findings from the CSI bridge program provided educators with significant knowledge for how to enhance teaching and

learning effectiveness with innovative technologies. Future study should explore STEM workforce development model to identify additional factors which encourage or hinder high school students and former CSI Academy attendees to pursue STEM education-career pathway. Insights of a follow-up longitude study can contribute to the discovery of a transformative model that allows institutional administrators, policy makers, grant seekers, and the research community to better inspire, support, and prepare the youth in our nation for their participation in the highly competitive workforce of the future.

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Leadership Enrichment Program (OSLEP) to attend a summer program on sustainability at the University of Oklahoma.

Appendix A

2015 CSI Summer Academy Program Agenda

Time	5/26 Tue (Day1)	5/27 Wed (Day 2)	5/28 TH (Day 3)	5/29 Fri (Day 4)	5/30 Sat (Day 5)
8:00 AM		Breakfast - Legends (5/26 - 5/28); Buddy Cafeteria (5/29) - See UCO Map; Bring your meal card			
9:00 AM	Registration (UCO Suite)	OSBI - Headquarter (Meet at B-113 by 8:45am); Dr. Cheng, Win, & Chris	Edmond Police (Randy Payne) - Drs. Williams & Cheng; Win	FBI Presentation (FSI Lecture Hall)	Post Survey
10:30 AM	Orientation: Troy Smith (B-113) Dr. Cheng & Chris			(1) DNA Presentation (James Creecy), (2) Guided Tour - Foresncis Science Institute & Labs (FSI)	Team presentation (B-113) Judges: Drs. Bartgis, Williams, & Mario
11:00 AM	Scenario & Team Briefing (911 & Dr. Bartgis) - Troy Smith (B-113) - All Team Leaders		Library: STEM Careers (Rm#226) - Christine Edwards/Naomi Schemm		
12:00 PM	Lunch - Legends (5/26 - 5/28); Buddy Cafeteria (5/29) - See UCO Map; Bring your meal card				
1:00 PM	Concurrent Sessions: (1) Teams 1,2,3 at Volley Court (Lead by Dr. Bartgis); (2) Finger Print Dusting (Teams 4&5 at the Maintenance) lead by Mario **View Virtual Detective Interview while waiting for sessions (B-113)	1: 30 pm OSBI - Edmond (Kelly Jackson) - Drs. Williams & Cheng; Win	SIM: Cross-Examination Witnesses (B109, 111) - Marios, Dr. Bartgis, & Team Leaders; Rotation: College Planning (TBD)	SIM: Cross Examination Suspects (B-109 & B-111) - Mario, Dr. Bartgis, & Team Leaders	
2:00 PM					
3:00 PM					
4:00 PM					
5:00 PM	Dinner - Legends (5/26 - 5/28); Buddy Cafeteria (5/29) - See UCO Map; Bring your meal card				
6:00 PM	Movie (B-113) - Drs. Bartgis, Cheng, Roxy	Case Update - Mario Holland	SIM Lab: Team Report & Crime Evidence Submission (B-109, B111); Team Leaders & Talisha	Team Report & Crime Evidence Submission - Team leaders & Talisha	
8:00 PM	Team Briefing, & PodCasting				
9:00 PM	Retire to Suite/Dorm Rooms				
10:00 PM	Lights out				

Appendix B

An Excerpt of the CSI Academy Survey

Please indicate the extent to which you agree or disagree with the following items.

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
I am aware of career opportunities in science, technology, engineering, and mathematics (STEM).	○	○	○	○	○	○	○
I enjoy learning STEM.	○	○	○	○	○	○	○
I am interested in pursuing a career in STEM.	○	○	○	○	○	○	○
I am aware of career opportunities specific to forensic science.	○	○	○	○	○	○	○
I am confident that I will be able to succeed in a STEM field.	○	○	○	○	○	○	○
I am interested in pursuing a career in forensic science.	○	○	○	○	○	○	○
I understand what professionals in forensic science do.	○	○	○	○	○	○	○

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
I enjoyed working on a STEM project as part of a team.	○	○	○	○	○	○	○
I gained a better understanding of how forensic science works.	○	○	○	○	○	○	○
I learned more about how STEM are conducted.	○	○	○	○	○	○	○
The field trips were beneficial to my learning.	○	○	○	○	○	○	○
The process of solving a real problem/crime was interesting.	○	○	○	○	○	○	○
I better understand the process of planning for college.	○	○	○	○	○	○	○
I better understand scholarship and grant opportunities available for college.	○	○	○	○	○	○	○

Appendix C

2015 CSI Academy Onsite Observation Evaluation Rubrics

Limited Value Added	Satisfactory Value Added	Significant Value Added
Lecture is primary lectures ….. Students not actively engaged in learning process; limited or no field experiences.	Some lecture …, students involved in cooperative learning groups and are actively engaged; appropriate field experiences	Limited lecture; students are actively engaged in cooperative learning groups; significant, interesting and appropriate field experiences.
		✓
Hands on experiences are basic, paper & pencil activities; competition unduly highlights student weaknesses	Hands on experiences are collaborative and involve the use of technology; any competition is appropriate and does not focus group on student weaknesses.	Hands on experiences are dynamic, collaborative experiences using technology leading to student discovery
		✓
Little diversity in student group; Academy is designed for high achieving students; little evidence of recruiting students from diverse backgrounds.	Students from a variety of academic backgrounds; developing and advanced learners are mixed together in work groups.	Apparent active recruiting of students with limited resources and academic experience; opening doors for first-generation or underserved students.
		✓
Students <u>would not recommend</u> the academy to their friends or wish to participate in the same academy again. Student experience engenders <u>indifference</u> to the Summer Academy program.	Students <u>would recommend</u> academy to friends and would definitely like to return to this academy or another one. Student experience engenders <u>enthusiasm</u> to the Summer Academy program.	Students <u>would strongly recommend</u> academy to friends and would definitely like to return to this academy or another one. Student experience <u>impacts their career or college plans positively.</u>
		✓
Sponsoring institution provides <u>limited</u> administrative support or flexibility for the Academy's success.	Sponsoring institution provides <u>adequate</u> administrative support or other support for the Academy's success.	Sponsoring institution provides <u>valuable and strong</u> administrative support or other support for the Academy's success.
		✓

List most important <u>strengths</u> of Academy:
The collaborative partnership model provided the CSI participants with venues to explore STEM careers. The bridge program also gave exposure to real-world experiences, best practices, modern forensics labs, and leading-edge technologies. Further, the CSI Academy provided high school students with job-shadowing opportunities to interact with crime-fighting professionals.

Any suggestions for improvement or Future Academies:
The CSI participants consistently urged the continuity of the CSI Academy program, so that more students can attend and be benefited by such an experiential experience.

Appendix D

A Ranked List of Favorite Activities & Future Implementations

Q19: What did you enjoy most about the 2015 CSI Summer Academy?	**Count**	***Q21: What changes would you like us to incorporate into future CSI / Summer Academies?***	**Count**
Field trips (i.e., OSBI, Edmond Police)	10	Longer week & more project time	4
Social connection & college experience	9	More guidance from the team leaders & facilitators	4
Team Collaboration & problem solving	8	More team- oriented project & more time to work on the crime	3
Job Shadowing, Role Playing, & Interactions with professionals	6	More fitness center/gym & recreational time	3
Hands-on activities (i.e., DNA, finger prints, blood sample) in a forensic lab	5	Later curfew & free time	3
Practical Experience & Real Life Scenario	4	More hands-on activities	3
Career Opportunities Exploration	4	More focus on Forensic	3
Interaction with Guest Speakers	4	More focus on the motive of the crime	1
General Enjoyment	5	More technical assistance with the interview process of witnesses & suspects in CSI-SIM	2
Role Playing as Detectives in CSI SIM	4	More "defense" side of the trial and case	1
College Experience	3	More finger printing activities	1

Appendix E

Student Appreciation for the 2015 CSI Bridge Program

Q20: ***Would you like to say something to staff at the funding agency (Oklahoma State Regents of Higher Education) and CSI team who made it possible for you to attend a summer academy?***
Thank you so much for funding, supporting, and serving so that I could have the opportunity to attend the CSI Summer Academy. It has helped me learn so much more about forensics than I did before.
Thank you Dr. Cheng and CSI team for the hard work to make this year's CSI Summer Academy great. I really enjoyed it. Thanks for allowing me to come and participate. It was fun and educational. I will be going into sophomore year of high school and it is time to start thinking about college. Ever since I was little, forensics intrigued me and UCO is my number one choice of in-state colleges.
Thank you for this opportunity to help us get a further understanding through this program. It was an amazing learning experience and great building block to our education and helps us decide what path to go down in college.
Thank you so much for providing students like myself the opportunity to learn more about forensics before getting into college. It was a fun learning experience!
Thank you for selecting me; I completely enjoyed the experience and will take much of it with me as I proceed towards the future.
Thank you for making this experience possible, it was fun and also made my understanding even better as it allowed me to visit different buildings, some I never even thought existed.
Thank you so much for doing this and making this a good experience.
I am glad to attend, thank you for giving me this opportunity. I learned so much about forensics and crime solving.
Thank you for his wonderful and educational experience.
This really convinced me to consider a job in forensics. I wasn't sure if forensics was a field I wanted to go into. Thank you for helping better understand the forensics field!
Thank you so much for this experience!
Thank you for allowing me to be a part of this great experience and camp!
HIGHLY APPRECIATE THE OPPORTUNITY.
Thank you for making this experience possible, it was fun and also made my understanding even better as it allowed me to visit different buildings, some I never even thought existed
Thank you so much for doing this and making this a good experience.
I am glad to attend, thank you for giving me this opportunity. I learned so much about forensics and crime solving.
Thanks much you for his wonderful experience.
This really convinced me to consider a job in forensics. I wasn't sure if forensics was a field I wanted to go into. Thank you for helping better understand the forensics field!
Thank you for allowing me to be a part of this great experience and camp!
Thank you for the opportunity.
Thank you so much for making this all possible
thank you so much I had a lot of fun
I appreciate them when they helped out and let us go see them.
Thank you for all the things you provided us such as the food and letting us get to go on tours and teaching us more about forensic science.
This camp was really fun! I appreciate you allowing me to have such a great experience!

Dr. Joselina Cheng has worked in the information technology industry for 20 years as a project manager, in which she designed, developed, and implemented software for Fortune 500 companies. In 2000, Dr. Cheng joined the academia with a vision to transform higher education by incorporating a strategic government-Industry-university (GIU) model and applying innovative technologies in her teaching, research, and community services. Dr. Cheng is the creator of over 100 tutorials, author of 13 journals, and primary investigator for over 23 grants with a total budget of $1.65 million. She is also the recipient of a Vanderford Leadership Award, Faulty Merit Credit award, Barnabas Fellowship, Desire to Learn Excel Impact Award, and a dozen of Distinguished Research Awards.

Rebekah Feng, President of Becks Intelligence Group, is a program evaluator for federal and state grants. She holds a Master's degree in Business Administration from the University of Maryland University College. Prior to forming her LLC, she was a Textbook Supervisor for Barnes and Noble College Booksellers who oversaw a Textbook Department generating approximately $ 6 million annually. While in college, she worked as a research assistant and co-presented papers in several international conferences. She also formed an LLC for a doctor at the University of Oklahoma Health Science Center. She was a recipient of six scholarships and the Outstanding Management Student Award. She was the President of the Human Resource Society. She was chosen by the Oklahoma State Regents of Higher Education, Oklahoma Scholar

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Adopting UDL Guidelines in the Higher Education Environment – A Case Study

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Abstract

Universal design for learning (UDL) refers to a set of guidelines published by the Center for Applied Special Technology centered around principles for curriculum development that provide a framework to give all individuals equal opportunities to learn (CAST, 2011). UDL complements teaching and learning initiatives in higher education that promote the use of technology in learning, encourage research on how students learn, and enhance successful teaching practices (Bransford, Brown & Cocking, 2000; Chickering & Gamson, 1987). Moreover, UDL proposes that deep learning is possible if the design methods, materials, and assessment utilized in the content development are highly flexible (Rose & Gravel, 2010; Rose & Meyer, 2002; Rose, Meyer, & Hitchcock, 2005). This study is twofold; first, it analyzes students' perceptions of the importance of UDL guidelines for online course development and delivery. One hundred and ninety students were surveyed at a regional higher education institution. The results provided measurable insights on which guidelines are important to students. Second, it describes a case study implementation of those UDL guidelines that were found essential in a single course at a higher education learning institution and its impact on student learning.

Keywords: Universal Design for Learning, UDL, distance education, online delivery.

Introduction

Universal Design for Learning

Today's classrooms are a mixture of students that not only speak different languages and come from different ethnicities and cultures, but also students with different physical, behavioral, and motivational needs. Classrooms are not a "one-size-fits-all" place of learning, but an environment where all different types of students, instructors, and administrators work together to achieve a high level of learning. This environment has been supported by legislation with the Individuals with Disabilities Education Act (IDEA) and the Amendments of 2004 (IDEA, 2004), which state that postsecondary education must be considered as a goal for all students. With this frame of mind, the researchers at the Center for Applied Special Technology (CAST) focused much of their efforts in setting up a pathway so all students with disabilities could gain access not only to the physical environment, but also to the curriculum itself. Their work produced what is considered now as the basis for general curriculum inclusion: Universal Design for Learning. (Meyer & Rose, 2000; Rose & Meyer, 2000) The idea of universal design originated in the area of architecture in the 1970's under Ron Mace (Center for Universal Design, 1997): "Universal design is the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design."(p.1). The seven principles for universal design as envisioned by Connel et al. covered by their work at the Center for Universal Design focus on the following areas: equitable use, flexibility in use, simple and intuitive use, perceptible information, tolerance for error, low physical effort, and size and space for approach and use (1997). These seven principles were then transferred to the education

setting with the same goals: reduce barriers to education and provide equitable access for all (Shaw, Scott, & McGuire, 2001). Moreover, in 2008, the Higher Education Opportunity Act established the statutory definition of UDL: "a scientifically valid framework for guiding educational practice that provides flexibility in the ways information is presented, in the ways students respond or demonstrate knowledge and skills and in the ways students are engaged" (20 U.S.C. § 1003 (24)). In 2010, the National Technology Education Plan uses UDL in many instances to refer to a framework that is set up to reduce any type of barriers to education, and at the same time increasing the learning opportunities for all students. Despite the fact that UDL was first introduced to improve the educational environment for students with disabilities, it has grown to become an all-inclusive movement where not only students with disabilities benefit from the changes proposed by UDL, but the general student population benefits as well. (Gradel & Edson, 2010) According to EnACT's recent survey, students considered several of the proposed UDL guidelines as important aspects of their learning. For example, results showed that clear course syllabi, multiple teaching styles, engagement in the classroom, and clear guidelines for assignments were extremely important for all students, not only students with disabilities. (EnACT, 2009)

Specific studies for UDL efficacy have been conducted in different settings and content areas. For example, Dalton et al. (2002) focused on improving literacy outcomes; specifically they studied the half a grade level improvement in reading achievement when 204 students utilized the online learning tool, Strategic Reader. Those students were also more on task than their peers utilizing non-digital strategy instruction. Abell, Jung, and Taylor (2011) studied the student's perceptions toward classroom environments that had been fitted with UDL and how it affected different grade levels. In their study, high school students showed higher perception

scores than lower level classmates. Coyne, Pisha, Dalton, Zeph, and Cook (2012), analyzed the implementation and usage of a technology based UDL approach to literacy instruction that yielded positive results for 16 students with significant intellectual disabilities. In the higher education environment, Schelly, Davies, and Spooner (2011), applied the UDL framework to higher education courses. Their study suggested that courses where the UDL framework has been implemented results in positive student academic and affective outcomes.

However, according to Rappolt-Schlichtmann, Daley and Rose (2012), there has been little research within the UDL framework. In 2011, a systematic review of empirical based articles yielded less than fifty peer reviewed articles published in the last ten years in higher education settings (Roberts, Park, Brown, & Cook 2011). Out of those, purely online education is not the subject of many. In fact, the researchers have not been able to find a peer-reviewed article that attempted to understand the student's perceptions of the importance of UDL guidelines in online courses. The researchers believe that it is extremely important to know the opinion of the students in a subject as close to them as this one; therefore, this study attempts to fill this knowledge void.

Universal Design for Learning Guidelines

UDL principles develop from different areas of research: neuroscience, design practices for instructional development, and learning sciences; all of those in conjunction attempt to create an environment where the learner is able to succeed (Rose & Gravel, 2010; Rose & Meyer, 2002). According to UDL (CAST, 2011), knowledge acquisition is best experienced from three different types of learning approaches or networks: first, the recognition network that attempts to explain how learners gather facts through senses. Second, strategic networks that attempt to

explain how learners plan and perform tasks, idea organization, and expression. Third, affective networks that attempt to explain how learners are motivated and engaged, and how they are challenged and interested. These three networks provide a path to curriculum development based in three main goals: for the recognition networks, content and information has to be presented in multiple ways. For the strategic networks, learners have to be given multiple ways of action and expression, so their knowledge is not contained into a single outlet. Finally, for the affective networks, learners have to be stimulated by providing multiple means of engagement. These guidelines do not attempt to create a static curriculum development framework; instead, curriculum development becomes a fluid process where the developer constantly analyzes the mechanics of the class and provides different paths of learning, expressing, and engaging to the learners.

UDL and Virtual Class Delivery.

The researchers believe that UDL guidelines are not only a great development for face to face instruction, but also they are a great fit for curriculum development in online classes. In face-to-face (F2F) classes, instructors may make modifications as the lesson is developing while scanning and analyzing the responses, both verbal and non-verbal, from the student body. In an online class, the learner responses are normally delayed and mostly all the time lost for the instructor. UDL provides a path for curriculum development that foresees learner differences and plans for them.

The researchers believe that in the case of an online classroom, providing a single method of knowledge delivery, a single method of expression, and a single method of assessment does not meet the needs of all learners. For this reason, the UDL guidelines are an optimal online

curriculum development set of directions that can only improve the learner' satisfaction with the online course as far as curriculum presentation and knowledge delivery during the learning experience, as well as a positive indicator of student's performance in the online course. This study attempts to understand how important the UDL guidelines are from the student's perspective. Students are the first hand users of the online classes; they are the ones best fit to provide insight on the importance of these guidelines. After those essential guidelines have been identified, the guidelines will be implemented in a case study at a single course in a higher education institution.

Research Questions

Although there have been many studies analyzing how UDL is beneficial for not only curriculum development, but also for student satisfaction and student performance at different levels; the majority of these studies are set in a face to face setting. Moreover, less than 50 studies were completed in a higher education setting in the first 10 years of UDL. (Roberts, Park, Brown, & Cook, 2011) For this reason, this is the time to transfer this research not only further into higher education, but focus it on the online environment where it is certainly needed as well. The majority of higher education institutions follow some type of guideline that accounts for the quality of their courses. For example, more than 700 colleges and universities are subscribed to the Quality Matters program for blended and online class development. (Quality Matters™, 2014) However, the researchers believe that UDL takes a step beyond the scope covered by the QM™ program. It is possible that the guidelines and requirements required by UDL may not be completely covered by the QM™ requirements. At the same time, the researchers believe that students, the ultimate users of the online classes, should be given a voice in this discussion. It is

important to know what guidelines students consider most important to be implemented in an online class. By considering all the above, the research questions are as follows:

R1: What are the most important UDL guidelines as perceived by the students?

R2: Are there any differences between the perceptions of online only students versus face to face, or both?

R3: Do these perceptions change depending on the classification of the student?

R4: Does the implementation of specific selected UDL guidelines make an impact on the student's perceived satisfaction with the course?

To answer these questions, the researchers surveyed students at a four-year higher education institution about the importance of each individual UDL guideline and developed a case study around a single course with specific UDL guidelines implemented.

Methodology

UDL Survey development

The researchers utilized a modified version of the UDL 2 guidelines published by CAST (2011). To comply with CAST requirements for the usage of the UDL guidelines, no changes to the core of the guidelines were made (CAST 2011). The researchers added an introductory question to each major area to create the survey: "How important is it for you that the online course has the following components?" (See appendix 1 for complete survey). Each guideline was then stated along with a 7 step rating scale from "not at all important" to "extremely important." Guidelines were separated by the 4 major areas (knowledge, affective, strategic, and all networks), and for each area the introductory question was repeated. Classification questions about the student's classification (freshman, sophomore, junior, senior) and experience with

online classes (how many classes taken and type of student) were also added to the survey. An informed consent question was also added to the survey to comply with IRB (Internal Review Board) requirements. In total, the survey had nine questions that were completed fully by 190 participants out of the 201 in the sample.

UDL Participants and timeline

Participants were 201 students enrolled in eight different classes at a four year higher education institution. The classes selected were all part of the Business School curriculum, both face to face and online offerings. Professors were given a link to an online survey to post on their course management system (Moodle), and asked to offer extra points to the students to complete the survey. Data collection took place during the last part of the spring 2014 semester. Participants were given a period of two weeks to complete the survey.

UDL Data sources

During the two weeks that the survey was active online, 201 students completed it. After a first look at the data collected was completed, eleven responses were deleted from the set due mainly to incomplete survey answers. The final set provided 190 complete responses. In terms of classification status, the majority of the participants were seniors (47.37%), followed by juniors (31.05%), graduating seniors (12.63%), sophomores (8.42%), and a single freshman (.53%)

Student Classification	Response Percent	Response Count
Freshman	0.5%	1
Sophomore	8.4%	16
Junior	31.1%	59
Senior	47.4%	90
Graduating Senior	12.6%	24

Table 1 - Counts and percentages of respondents by student classification

The majority of the students were online only students (49.74%), followed by mainly face to face students with some online classes (36.51%), and online mainly with some face to face classes (13.76%).

Delivery type	Response Percent	Response Count
Online only student (100% online)	49.7%	95
Face to Face mainly with some online classes (75% Face to Face & 25% online)	36.5%	69
Online mainly with some face to face classes (75% Online and 25% Face to face)	13.8%	26

Table 2 – Counts and percentages of respondents by delivery type

Most participants had completed more than 10 online classes when the survey was performed (57.89%), whereas only four students had taken a single online class (2.11%)

How many online classes have you completed?		
Number of online classes taken	**Response Percent**	**Response Count**
1	2.1%	4
2	7.4%	14
3	5.3%	10
4	8.4%	16
5	4.2%	8
6	3.2%	6
7	2.1%	4
8	7.4%	14
9	1.1%	2
10	1.1%	2
More than 10	57.9%	111

Table 3 – Counts and percentages of completed online classes by respondents

Case Study Methodology

Two sections of the same junior level class at a higher education institution were utilized for this case study. Students were given the same type of assignments and assessments for a formal semester grade. The same professor taught both sections of the class to minimize the bias.

One of the sections became UDL enhanced, whereas the second section remained traditionally taught. The enhancements were varied, but they mostly provided opportunities to support the top 5 UDL guidelines that the students and the faculty indicated as most important. Some examples of these enhancements are: addition of goals, objectives, content, and assessment pathway so students were able to see exactly what content referred to what goal and how the goal would be accomplished and measured, individualized student feedback in the form of practice quizzes graded automatically and video recorded feedback for each individual student in the subjective assignments (charts, use case diagrams, activity diagrams, class diagrams, and others), and the addition of detailed checklists and electronic reminders. Student evaluations were utilized in both cases to review the student's perceptions of satisfaction with the class. In the UDL enhanced class, 18 out of a possible 21 student group completed the evaluation (85.71% return rate). The respondents were juniors and seniors in the same School of Business major.

Results

Data was analyzed at four different levels to answer the research questions. First, an overall mean of all students' perceptions based on each UDL guideline was calculated to highlight which UDL guidelines were considered most important by the students. Second, a difference in means analysis was conducted to find if students with different classifications (freshman, sophomore, junior, senior, graduating senior) considered different UDL guidelines to be more or less important. Third, a difference in means analysis was conducted to find if online only students considered different guidelines to be more or less important than students that took online and face to face classes. Fourth, and final, the end of the semester evaluations were analyzed to discern if the UDL enhancements had made a difference in the perceived student satisfaction with the course.

The first analysis took into consideration which one of the complete set of UDL guidelines was considered the most important in the student's view for an online class. The highest UDL guideline was *3.2: Highlight essential information and big ideas* with a 5.88 score on a scale of 1 to 7 where 1 was not important at all and 7 was extremely important. The lowest score was guideline *2.4: Provides connections across different languages* with a score of 4.45 on the same scale. Results are summarized on the table below. Complete results can be seen in Appendix 2.

UDL Guideline	Mean	Std. Deviation	Variance
3.2 Highlight essential information & "big ideas" - Emphasize key elements, use organizer, prompts & cues to identify & connect key elements, use multiple examples and non-examples, mask or reduce extraneous elements, etc.	5.88	1.058	1.119
10.5 Options for feedback - Teacher: acknowledgement, probing, challenging questions, positive feedback, detained response, real-time vs delayed, etc. Student: journals, writing, prompts, reflection, peer feedback, self-evaluation, self-awareness, etc.	5.81	1.154	1.332
3.4 Support memory & knowledge transfer - Checklists, sticky notes, electronic reminders, mnemonic devices, space out reviews, organizers for note-taking, connect new information & prior knowledge, embed analogies & metaphors, etc.	5.74	1.248	1.557
5.4 Focus feedback on effort, practice, and mastery - Encourage perseverance, self-awareness & self-efficacy, emphasize effort & improvement, give frequent, on-going, & substantive feedback, model evaluation strategies, etc.	5.71	1.148	1.318
5.1 Strengthen connection to goals and objectives - Develop explicit goals, restate goals for clarity, clearly display goals, develop sort-term objectives for long-term goals, use prompts to visualize & clarify outcomes, etc.	5.64	1.164	1.354
(…)	(…)	(…)	(…)
2.3 Alternatives for text symbols & mathematical symbols - Text-to-speech programs for digital text, use digital math notations (Math ML) with voicing, use text alternatives (tapes, DVD, digital text) with human voicing, etc	5.03	1.501	2.253
1.2 Alternatives for auditory information - Text provided for spoken language, voice recognition-to-text, visual symbols for emphasis, sound alerts, etc.	5.02	1.473	2.169
2.5 Use non-language alternatives for concepts - Present complementary representations (e.g. text with animation/graphics, etc.), link illustrations and verbal enhancements, make text-to-chart or diagram links explicit, etc.	4.98	1.431	2.047
5.3 Support collaboration & communication with peers - Cooperative learning groups, clarify roles & responsibilities, positive behavioral supports, differentiated supports, peer tutoring & support systems, connect to virtual communities, etc.	4.92	1.653	2.734
2.4 Provides connections across different languages - Key information in dominant and second languages, vocabulary definitions & pronunciations in both languages, shared/related roots identified, syntax/grammar links & differences identified	4.45	1.821	3.318

Table 4 – Summary of UDL guidelines by highest and lowest means

Results for the difference in means analysis provided no significance among any of the previously stated groups. There was no statistical significance between the means of students depending on if they were completely online or only partially online for all the guidelines except for one. There was a statistically significant difference in means between the analyzed groups for Guideline *4.2: Make learning personally relevant and valuable* with an F-statistic of 3.82 and a p-value of .024. The complete ANOVA table can be seen in Appendix 4.

Similar results were found when the analysis of means was performed on the student classification. In this case, there was no statistical significance to any difference in means between the analyzed groups. There was no reason to believe that the means between the groups were different.

In the case of the student evaluations, 89% of the students surveyed stated that there was a clear connection between the learning objectives stated in the class, the material covered in the class, and the assignments in the class which supports UDL Guideline 5.1: 5.1 Strengthen connection to goals and objectives. 94% of the students also indicated that feedback was always provided promptly. Overall, 12 out of the 18 students surveyed rated the course as superior and 6 rated it as good, providing an overall course satisfaction rate of 4.67 out of 5. Finally, the student comments highlighted how the individualized video feedback really helped the learning process. In the non-UDL enhanced class, students rated the connection between goals, content, and assignments differently than the UDL enhanced class. In the case of the non-UDL class, the percentage of students selecting “Always” to the goal-content-assessment was lower as it was the number of students selecting “Always” to the “intellectually stimulating” content (11 out of 14 students). In terms of overall satisfaction with the course, 11 students rated it as superior, 1 rated it as good, and 2 rated it as fair; which provided a 4.64 mean score out of a possible 5.

Discussion

First, it is interesting to notice that the overall mean for all UDL guidelines analyzed was above the "neutral" area of our scale ratings, from 1, not important at all, to 7 extremely important. The overall average was 5.34, which places the perception of the students for the UDL guidelines on the important side of the scale. Students seem to value the different areas equally as well. When the overall means were grouped by networks (recognition, strategic, affective, and all), the ratings were not that separate from each other: all networks were in the 5.3~5.4 range. Drilling down into the specific guidelines, the researchers also found some interesting insights. For example, looking at the lower side of the rankings, *2.4: Provides connections across different languages*, was rated the least important by the students. It is interesting to notice that in a previous study by Wright et al. (2014) this was the guideline that was covered the least in the online classes. This may be the reason why students have not rated it as high as others. Maybe if the courses taken had had a greater exposure to these different languages, the guidelines could have been considered more important.

Another important aspect of the study, and a result that the researchers thought would be necessary to mention is the fact that only one guideline had a significantly different mean when completely online vs. hybrid students were compared. Guideline 4.2: Make learning personally relevant and valuable had a higher importance for the online only students than for the hybrid groups. The researchers believe that this result supports the current research on communities of practice and social presence applied to online learning, where learners are more satisfied and achieve a higher level of knowledge transfer when the student feels part of a community of learners, and the topic is presented in a way that is personal to the student's experience. The

importance of this aspect is higher for the online only students, because they do not have the benefit of belonging to a community that meets in face to face classes.

Finally, the fact that the analysis found no differences in the means when the respondents were grouped by classification is extremely important as well. The students, the participants of this study, have taken online classes and recognize the guidelines as important to their online classes. This result also speaks about the consistency in online offerings. If students were to have had different perceptions depending on their classification, one could think that their online experiences had been different in terms of the possible elements present or not present in the courses. However, no difference between groups points to a similar experience in terms of online classes across the courses.

As shown by the results, when the UDL Guidelines that were most important for all the groups were included in the pilot course, students seemed to be more satisfied and more connected with the materials than when the course did not have a specific emphasis on those guidelines. More students rated the UDL enhanced course as superior than the non-UDL course.

Overall, these results are important for faculty and curriculum developers. They provide a substantial road map to improve their courses if a complete coverage of UDL guidelines is desired or even required for online courses.

Limitations

This study only surveyed a sample of 190 students in a 4-year regional higher education institution, and had a small class sample size for the UDL enhancement. Students were taking both, face-to-face and online classes at the time. Results may have been different if the students had never taken an online class before. The experience level and different classification of the

students may have influenced the results. Moreover, all the students surveyed were taking classes at the same academic area (Business); it is possible that different results may appear if students from different academic areas are surveyed. Finally, the limited number of students in the application of the UDL guidelines test makes the results of this study very limited in terms of generalization.

Conclusion

This study reviewed the students' perceptions of the relative importance of individual UDL guidelines for online classes. Results suggest that students at all levels and with different delivery methodologies and classroom experience consider the UDL guidelines important for an online class. Moreover, in the pilot application of the UDL guidelines to a course, students' satisfaction with the course was rated very positively.

This study is significant because it not only helps the course developer focus on what the students think is necessary in an online class, but also helps the administration in terms of retention of students. If the online classes have the elements that the students require, students will have the course in higher regard and feel more confident, which in turn may reduce the abandonment level and increase retention.

Future studies should review the full implementation of the UDL guidelines into several online classes and how the UDL guidelines impact the student's satisfaction and performance. The researchers expect those students taking the classes with full coverage of UDL guidelines to be more satisfied and perform better in the classes than those students in classes that have not been in compliance with UDL guidelines. The hope is that by completely adopting UDL

guidelines into the courses, the students at this institution will be more satisfied with the online experience and ultimately will perform at a higher level.

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Appendix 1 – Survey instrument

I. Provide multiple means of representation (Knowledge Networks) How important is it for you that the online course has the following components?	Not at all important	Low importance	Slightly important	Neutral	Moderately Important	Very Important	Extremely Important
1.1 Vary ways to display information: Visual information: size, contrast, color, layout, spacing, etc. Auditory information: amplitude, speed, timing, cueing, etc.							
1.2 Alternatives for auditory information - Text provided for spoken language, voice recognition-to-text, visual symbols for emphasis, sound alerts, etc.							
1.3 Alternatives for visual information - Text or spoken equivalents for graphics/video/animation, tactile supports for visuals, Use of physical objects or spatial models, etc							
2.1 Alternative access to key vocabulary & language - Pre-teach vocabulary & symbols, highlight components of complex words, embed vocabulary supports in text – hyperlinks, footnotes, definitions, etc.							
2.2 Clarify language structure & rules - Make rules & relationships explicit, clarify links between concepts, use less complex vocabulary or language structures, etc.							
2.3 Alternatives for text symbols & mathematical symbols - Text-to-speech programs for digital text, use digital math notations (Math ML) with voicing, use text alternatives (tapes, DVD, digital text) with human voicing, etc							
2.4 Provides connections across different languages - Key information in dominant and second languages, vocabulary definitions & pronunciations in both languages, shared/related roots identified, syntax/grammar links & differences							
2.5 Use non-language alternatives for concepts - Present complementary representations (e.g. text with animation/graphics, etc.), link illustrations and verbal enhancements, make text-to-chart or diagram links explicit, etc.							
3.1 Access background knowledge - Activate prior knowledge with imagery, concepts, etc., use organizers (KWL, concept maps, etc.), pre-teach concepts, "bridge" ideas with analogies & metaphors, etc.							
3.2 Highlight essential information & "big ideas" - Emphasize key elements, use organizer, prompts & cues to identify & connect key elements, use multiple examples and non-examples, mask or reduce extraneous elements, etc.							
3.3 Guide information selection & processing - Use interactive models, explicit prompts and scaffolds, develop multiple points-of-entry & pathways for content, chunk information, release information progressively, etc.							
3.4 Support memory & knowledge transfer - Checklists, sticky notes, electronic reminders, mnemonic devices, space out reviews, organizers for note-taking, connect new information & prior knowledge, embed analogies & metaphors, etc.							
II. Provide multiple means for engagement (Affective Networks) How important is it for you that the online course has the following components?	Not at all important	Low importance	Slightly important	Neutral	Moderately Important	Very Important	Extremely Important
4.1 Support individual choice & autonomy - Challenge levels, types of recognition used, vary content or context for learning, choice of information tools, design of products, timing & sequence of tasks, etc.							
4.2 Make learning personally relevant & valuable - Activities personalized to students' lives, socially relevant, age & ability appropriate, culturally & racially appropriate, active participation, authentic & purposeful outcomes, use of self-							
4.3 Reduce distractions and perceived threats - Vary novelty & risk-taking in activities & transitions predictability, scheduling, routines, novel events, etc.), vary sensory stimulation levels (background noise, # of items, etc.), vary pace &							

	5.1 Strengthen connection to goals and objectives - Develop explicit goals, restate goals for clarity, clearly display goals, develop sort-term objectives for long-term goals, use prompts to visualize & clarify outcomes, etc.						
	5.2 Vary levels of challenge & support - Vary difficulty in core activities, use tools & scaffolds to provide alternatives, use collaboration, vary ranges for acceptable work, emphasize process, effort & improvement, etc.						
	5.3 Support collaboration & communication with peers - Cooperative learning groups, clarify roles & responsibilities, positive behavioral supports, differentiated supports, peer tutoring & support systems, connect to virtual communities, etc.						
	5.4 Focus feedback on effort, practice, and mastery - Encourage perseverance, self-awareness & self-efficacy, emphasize effort & improvement, give frequent, on-going, & substantive feedback, model evaluation strategies, etc.						
	6.1 Support and guide personal goal-setting - Model goal-setting process, coach or mentor students in goal-setting, use prompts, rubrics, checklists, etc. to support self-regulatory goals, on-task behaviors, and self-reinforcements, etc.						
	6.2 Develop individualized coping skills - Use differentiated models & feedback to develop skills e.g managing frustration, seeking emotional support, and developing internal controls, etc.						
	6.3 Support self-monitoring and self-assessment - Use tools & models to collect & determine own behaviors (e.g. charts, recording devices, peers, etc.),build student self- awareness (and reduce scaffolds) over time, etc.						
	III. Provide multiple means for action & expression (Strategic Networks) How important is it for you that the online course has the following components?	Not at all important	Low importance	Slightly important	Neutral	Moderately Important	Very Important	Extremely Important
	7.1 Varied & alternative physical responses - Alternatives in rate, timing, amplitude, range-of-motion, materials, manipulatives, & technologies, allow response alternatives from standard means (e.g. computer response vs paper &						
	7.2 Varied ways to interact with materials - Use multiple means of navigating materials (e.g. by hand, by voice, by switch, by keyboard, etc.)						
	7.3 Use assistive technologies for access to learning - Determine appropriate technologies (physical, sensory, cognitive, communication) needed to access instruction, integrate training to support & enhance learning and goal						
	8.1 Vary choices for expression of knowledge - Choices may include text, speech, illustration, physical models, film, video, pictures, music, art, etc.						
	8.2 Vary tools for composition & problem solving - Choices may include spell checks, grammar checks, word prediction, speech-to-text software, dictation, recording, sentence starters, story webs, concept webs, outlining tools,						
	8.3 Vary ways to support practice and performance - Differentiated approaches, strategies, skills to achieve same outcomes, use diverse mentors to guide differentiation processes, gradual release of supports to increase independence,						
	9.1 Guide & support effective goal setting - Use a variety of tools (e.g. prompts, scaffolds, models, guides, checklists) to support process of individualized and appropriate goal-setting, etc.						
	9.2 Support goal-related planning and strategy development - Use “stop & think” prompts, use checklists and templates to prioritize & sequence, model “thinkaloud” process, guide transition from long-term goals to short-term						
	9.3 Use tools to manage information & resources - Keep information organized and accessible with graphic organizers, templates, embedded prompts, checklists, note-taking guides, software tools, etc.						
	9.4 Enhance capacity for formative progress self-monitoring - Develop self-monitoring through guided questions, frequent representations of progress, self reflection templates, differentiated self-assessment strategies, etc.						
	IV. Use multiple means of assessment of student understanding (All Networks) How important is it for you that the online course has the following components?	Not at all important	Low importance	Slightly important	Neutral	Moderately Important	Very Important	Extremely Important

	10.1 Options for methods - Discrete vs elaborative response (ie multiple choice vs essay), varied time allowance, individualized vs group or peer-supported, location varies w/in the curriculum, mbedding assessment opportunities, etc.							
	10.2 Options for formats - Visual information: photographs, pictures, picture-symbols, written, computer text, computer text-to-speech, video, kinesthetic supports (w low-tech), etc.							
	Auditory information: Oral, technology-supported (taped, computer speech-to-text, voiced word processing, kinesthetic supports (w low-tech), etc.							
	10.3 Options for scope/range/level - Choice in number of items, type of items. Choice in focus. Connects across levels. Tiered assessments - from “big idea”(all learners) to complex details (some learners), Multiple levels of understanding-							
	10.4 Options for product & outcome - Consider formative vs summative assessment. Consider authentic assessments with “real-world” products. Include differentiated products (e.g. plays, video productions, essays, point-of-view							
	10.5 Options for feedback - Teacher: acknowledgement, probing, challenging questions, positive feedback, detained response,real-time vs delayed, etc. Student: journals, writing, prompts, reflection, peer feedback, self-evaluation, self							

How many online classes have you completed?	1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10 or more
Are you an ONLINE ONLY student or do you take both Face to Face and Online classes?	Online only - Online with a few F2F classes - F2F with a few Online classes
Please select your status	Freshman - Sophomore - Junior - Senior - Graduating Senior

Appendix 2 – Summary of results by individual guidelines.

UDL Guideline	Mean	Std. Deviation	Variance
1.1 Vary ways to display information: Visual information: size, contrast, color, layout, spacing, etc. Auditory information: amplitude, speed, timing, cueing, etc.	5.54	1.375	1.890
1.2 Alternatives for auditory information - Text provided for spoken language, voice recognition-to-text, visual symbols for emphasis, sound alerts, etc.	5.02	1.473	2.169
1.3 Alternatives for visual information - Text or spoken equivalents for graphics/video/animation, tactile supports for visuals, Use of physical objects or spatial models, etc	5.37	1.338	1.791
2.1 Alternative access to key vocabulary & language - Pre-teach vocabulary & symbols, highlight components of complex words, embed vocabulary supports in text – hyperlinks, footnotes, definitions, etc.	5.35	1.312	1.722
2.2 Clarify language structure & rules - Make rules & relationships explicit, clarify links between concepts, use less complex vocabulary or language structures, etc.	5.55	1.431	2.047
2.3 Alternatives for text symbols & mathematical symbols - Text-to-speech programs for digital text, use digital math notations (Math ML) with voicing, use text alternatives (tapes, DVD, digital text) with human voicing, etc	5.03	1.501	2.253
2.4 Provides connections across different languages - Key information in dominant and second languages, vocabulary definitions & pronunciations in both languages, shared/related roots identified, syntax/grammar links & differences identified	4.45	1.821	3.318
2.5 Use non-language alternatives for concepts - Present complementary representations (e.g. text with animation/graphics, etc.), link illustrations and verbal enhancements, make text-to-chart or diagram links explicit, etc.	4.98	1.431	2.047
3.1 Access background knowledge - Activate prior knowledge with imagery, concepts, etc., use organizers (KWL, concept maps, etc.), pre-teach concepts, “bridge” ideas with analogies & metaphors, etc.	5.36	1.289	1.661
3.2 Highlight essential information & “big ideas” - Emphasize key elements, use organizer, prompts & cues to identify & connect key elements, use multiple examples and non-examples, mask or reduce extraneous elements, etc.	5.88	1.058	1.119
3.3 Guide information selection & processing - Use interactive models, explicit prompts and scaffolds, develop multiple points-of-entry & pathways for content, chunk information, release information progressively, etc.	5.46	1.153	1.329
3.4 Support memory & knowledge transfer - Checklists, sticky notes, electronic reminders, mnemonic devices, space out reviews, organizers for note-taking, connect new information & prior knowledge, embed analogies & metaphors, etc.	5.74	1.248	1.557
4.1 Support individual choice & autonomy - Challenge levels, types of recognition used, vary content or context for learning, choice of information tools, design of products, timing & sequence of tasks, etc.	5.26	1.160	1.346
4.2 Make learning personally relevant & valuable - Activities personalized to students’ lives, socially relevant, age & ability appropriate, culturally & racially appropriate, active participation, authentic & purposeful outcomes, use of self-reflection, etc.	5.54	1.279	1.636

4.3 Reduce distractions and perceived threats - Vary novelty & risk-taking in activities & transitions predictability, scheduling, routines, novel events, etc.), vary sensory stimulation levels (background noise, # of items, etc.), vary pace & length of work sessions, vary social demands required for activities, etc.	5.46	1.250	1.562
5.1 Strengthen connection to goals and objectives - Develop explicit goals, restate goals for clarity, clearly display goals, develop sort-term objectives for long-term goals, use prompts to visualize & clarify outcomes, etc.	5.64	1.164	1.354
5.2 Vary levels of challenge & support - Vary difficulty in core activities, use tools & scaffolds to provide alternatives, use collaboration, vary ranges for acceptable work, emphasize process, effort & improvement, etc.	5.36	1.191	1.418
5.3 Support collaboration & communication with peers - Cooperative learning groups, clarify roles & responsibilities, positive behavioral supports, differentiated supports, peer tutoring & support systems, connect to virtual communities, etc.	4.92	1.653	2.734
5.4 Focus feedback on effort, practice, and mastery - Encourage perseverance, self-awareness & self-efficacy, emphasize effort & improvement, give frequent, on-going, & substantive feedback, model evaluation strategies, etc.	5.71	1.148	1.318
6.1 Support and guide personal goal-setting - Model goal-setting process, coach or mentor students in goal-setting, use prompts, rubrics, checklists, etc. to support self-regulatory goals, on-task behaviors, and self-reinforcements, etc.	5.50	1.238	1.532
6.2 Develop individualized coping skills - Use differentiated models & feedback to develop skills e.g., managing frustration, seeking emotional support, and developing internal controls, etc.	5.33	1.341	1.798
6.3 Support self-monitoring and self-assessment - Use tools & models to collect & determine own behaviors (e.g. charts, recording devices, peers, etc.),build student self- awareness (and reduce scaffolds) over time, etc.	5.26	1.323	1.750
7.1 Varied & alternative physical responses - Alternatives in rate, timing, amplitude, range-of-motion, materials, manipulatives, & technologies, allow response alternatives from standard means (e.g. computer response vs paper & pencil), etc.	5.10	1.390	1.932
7.2 Varied ways to interact with materials - Use multiple means of navigating materials (e.g. by hand, by voice, by switch, by keyboard, etc.)	5.05	1.477	2.183
7.3 Use assistive technologies for access to learning - Determine appropriate technologies (physical, sensory, cognitive, communication) needed to access instruction, integrate training to support & enhance learning and goal achievement, etc.	5.18	1.410	1.989
8.1 Vary choices for expression of knowledge - Choices may include text, speech, illustration, physical models, film, video, pictures, music, art, etc.	5.29	1.263	1.595
8.2 Vary tools for composition & problem solving - Choices may include spell checks, grammar checks, word prediction, speech-to-text software, dictation, recording, sentence starters, story webs, concept webs, outlining tools, calculators, graphing calculators, software for problem solving skills, Computer-Aided Design (CAD), etc.	5.43	1.223	1.495
8.3 Vary ways to support practice and performance - Differentiated approaches, strategies, skills to achieve same outcomes, use diverse mentors to guide differentiation processes, gradual release of supports to increase independence, etc.	5.36	1.284	1.649
9.1 Guide & support effective goal setting - Use a variety of tools (e.g. prompts, scaffolds, models, guides, checklists) to support process of individualized and appropriate goal-setting, etc.	5.38	1.249	1.559

9.2 Support goal-related planning and strategy development - Use “stop & think” prompts, use checklists and templates to prioritize & sequence, model “thinkaloud” process, guide transition from long-term goals to short-term objectives, etc.	5.41	1.199	1.438
9.3 Use tools to manage information & resources - Keep information organized and accessible with graphic organizers, templates, embedded prompts, checklists, note-taking guides, software tools, etc.	5.59	1.112	1.237
9.4 Enhance capacity for formative progress self-monitoring - Develop self-monitoring through guided questions, frequent representations of progress, self reflection templates, differentiated self-assessment strategies, etc.	5.32	1.225	1.500
10.1 Options for methods - Discrete vs elaborative response (ie multiple choice vs essay), varied time allowance, individualized vs group or peer-supported, location varies w/in the curriculum, mbedding assessment opportunities, etc.	5.23	1.489	2.218
10.2 Options for formats - Visual information: photographs, pictures, picture-symbols, written, computer text, computer text-to-speech, video, kinesthetic supports (w low-tech), etc.	5.37	1.205	1.451
Auditory information: Oral, technology-supported (taped, computer speech-to-text, voiced word processing, kinesthetic supports (w low-tech), etc.	5.20	1.269	1.611
10.3 Options for scope/range/level - Choice in number of items, type of items. Choice in focus. Connects across levels. Tiered assessments - from “big idea”(all learners) to complex details (some learners), Multiple levels of understanding- concrete through synthesis, etc.	5.31	1.227	1.506
10.4 Options for product & outcome - Consider formative vs summative assessment. Consider authentic assessments with “real-world” products. Include differentiated products (e.g. plays, video productions, essays, point-of-view “rafts”, “tic-tac-toes”, debates, artistic productions, student-driven assessments, etc.)	5.23	1.305	1.703
10.5 Options for feedback - Teacher: acknowledgement, probing, challenging questions, positive feedback, detained response, real-time vs delayed, etc. Student: journals, writing, prompts, reflection, peer feedback, self-evaluation, self-awareness, etc.	5.81	1.154	1.332

ANOVA

		Sum of Squares	df	Mean Square	F
1.1 Vary ways to display information: Visual information: size, contrast, color, layout, spacing, etc. Auditory information: amplitude, speed, timing, cueing, etc.	Between Groups	.039	2	.020	.01
	Within Groups	356.913	186	1.919	
	Total	356.952	188		
1.2 Alternatives for auditory information - Text provided for spoken language, voice recognition-to-text, visual symbols for emphasis, sound alerts, etc.	Between Groups	.330	2	.165	.07
	Within Groups	409.585	186	2.202	
	Total	409.915	188		
1.3 Alternatives for visual information - Text or spoken equivalents for graphics/video/animation, tactile supports for visuals, Use of physical objects or spatial models, etc	Between Groups	2.672	2	1.336	.74
	Within Groups	335.402	186	1.803	
	Total	338.074	188		
2.1 Alternative access to key vocabulary & language - Pre-teach vocabulary & symbols, highlight components of complex words, embed vocabulary supports in text – hyperlinks, footnotes, definitions, etc.	Between Groups	2.564	2	1.282	.73
	Within Groups	322.684	186	1.735	
	Total	325.249	188		
2.2 Clarify language structure & rules - Make rules & relationships explicit, clarify links between concepts, use less complex vocabulary or language structures, etc.	Between Groups	3.446	2	1.723	.83
	Within Groups	383.326	186	2.061	
	Total	386.772	188		
2.3 Alternatives for text symbols & mathematical symbols - Text-to-speech programs for digital text, use digital math notations (Math ML) with voicing, use text alternatives (tapes, DVD, digital text) with human voicing, etc	Between Groups	.021	2	.010	.00
	Within Groups	425.789	186	2.289	
	Total	425.810	188		
2.4 Provides connections across different languages - Key information in dominant and second languages, vocabulary definitions & pronunciations in both languages, shared/related roots identified, syntax/grammar links & differences identified	Between Groups	.996	2	.498	.14
	Within Groups	625.872	186	3.365	
	Total	626.868	188		
2.5 Use non-language alternatives for concepts - Present complementary representations (e.g. text with animation/graphics, etc.), link illustrations and verbal enhancements, make text-to-chart or diagram links explicit, etc.	Between Groups	.556	2	.278	.13
	Within Groups	385.359	186	2.072	
	Total	385.915	188		
3.1 Access background knowledge - Activate prior knowledge with imagery, concepts, etc., use organizers (KWL, concept maps, etc.), pre-teach concepts, "bridge" ideas with analogies & metaphors, etc.	Between Groups	.169	2	.085	.05
	Within Groups	313.365	186	1.685	
	Total	313.534	188		
3.2 Highlight essential information & "big ideas" - Emphasize key elements, use organizer, prompts & cues to identify & connect key elements, use multiple examples and non-examples, mask or reduce extraneous elements, etc.	Between Groups	1.986	2	.993	.88
	Within Groups	209.453	186	1.126	
	Total	211.439	188		
3.3 Guide information selection & processing - Use interactive models, explicit prompts and scaffolds, develop multiple points-of-entry & pathways for content, chunk information, release information progressively, etc.	Between Groups	.522	2	.261	.19
	Within Groups	250.346	186	1.346	
	Total	250.868	188		
3.4 Support memory & knowledge transfer - Checklists, sticky notes, electronic reminders, mnemonic devices, space out reviews, organizers for note-taking, connect new information & prior knowledge, embed analogies & metaphors, etc.	Between Groups	1.245	2	.622	.39
	Within Groups	293.052	186	1.576	
	Total	294.296	188		
4.1 Support individual choice & autonomy - Challenge levels, types of recognition used, vary content or context for learning, choice of information tools, design of products, timing & sequence of tasks, etc.	Between Groups	3.701	2	1.851	1.37
	Within Groups	250.108	186	1.345	
	Total	253.810	188		
4.2 Make learning personally relevant & valuable - Activities personalized to students' lives, socially relevant, age & ability appropriate, culturally & racially appropriate, active participation, authentic & purposeful outcomes, use of self-reflection, etc.	Between Groups	12.122	2	6.061	3.82
	Within Groups	294.904	186	1.586	
	Total	307.026	188		
4.3 Reduce distractions and perceived threats - Vary novelty & risk-taking in activities & transitions predictability, scheduling, routines, novel events, etc.), vary sensory stimulation levels (background noise, # of items, etc.), vary pace & length of work sessions, vary social demands required for activities, etc.	Between Groups	4.262	2	2.131	1.37
	Within Groups	288.606	186	1.552	
	Total	292.868	188		
5.1 Strengthen connection to goals and objectives - Develop explicit goals, restate goals for clarity, clearly display goals, develop sort-term objectives for long-term goals, use prompts to visualize & clarify outcomes, etc.	Between Groups	4.295	2	2.147	1.59
	Within Groups	249.780	186	1.343	
	Total	254.074	188		
5.2 Vary levels of challenge & support - Vary difficulty in core activities, use tools & scaffolds to provide alternatives, use collaboration, vary ranges for acceptable work, emphasize process, effort & improvement, etc.	Between Groups	2.462	2	1.231	.86
	Within Groups	265.072	186	1.425	
	Total	267.534	188		
5.3 Support collaboration & communication with peers - Cooperative learning groups, clarify roles & responsibilities, positive behavioral supports, differentiated supports, peer tutoring & support systems, connect to virtual communities, etc.	Between Groups	7.304	2	3.652	1.34
	Within Groups	504.982	186	2.715	
	Total	512.286	188		

5.4 Focus feedback on effort, practice, and mastery - Encourage perseverance, self-awareness & self-efficacy, emphasize effort & improvement, give frequent, on-going, & substantive feedback, model evaluation strategies, etc.	Between Groups	.638	2	.319	.24
	Within Groups	246.770	186	1.327	
	Total	247.407	188		
6.1 Support and guide personal goal-setting - Model goal-setting process, coach or mentor students in goal-setting, use prompts, rubrics, checklists, etc. to support self-regulatory goals, on-task behaviors, and self-reinforcements, etc.	Between Groups	3.191	2	1.596	1.04
	Within Groups	284.047	186	1.527	
	Total	287.238	188		
6.2 Develop individualized coping skills - Use differentiated models & feedback to develop skills e.g managing frustration, seeking emotional support, and developing internal controls, etc.	Between Groups	4.256	2	2.128	1.19
	Within Groups	332.696	186	1.789	
	Total	336.952	188		
6.3 Support self-monitoring and self-assessment - Use tools & models to collect & determine own behaviors (e.g. charts, recording devices, peers, etc.),build student self-awareness (and reduce scaffolds) over time, etc.	Between Groups	2.729	2	1.365	.78
	Within Groups	325.080	186	1.748	
	Total	327.810	188		
7.1 Varied & alternative physical responses - Alternatives in rate, timing, amplitude, range-of-motion, materials, manipulatives, & technologies, allow response alternatives from standard means (e.g. computer response vs paper & pencil), etc.	Between Groups	.964	2	.482	.24
	Within Groups	360.507	186	1.938	
	Total	361.471	188		
7.2 Varied ways to interact with materials - Use multiple means of navigating materials (e.g. by hand, by voice, by switch, by keyboard, etc.)	Between Groups	.739	2	.369	.16
	Within Groups	408.002	186	2.194	
	Total	408.741	188		
7.3 Use assistive technologies for access to learning - Determine appropriate technologies (physical, sensory, cognitive, communication) needed to access instruction, integrate training to support & enhance learning and goal achievement, etc.	Between Groups	3.529	2	1.765	.88
	Within Groups	369.053	186	1.984	
	Total	372.582	188		
8.1 Vary choices for expression of knowledge - Choices may include text, speech, illustration, physical models, film, video, pictures, music, art, etc.	Between Groups	5.095	2	2.547	1.61
	Within Groups	293.477	186	1.578	
	Total	298.571	188		
8.2 Vary tools for composition & problem solving - Choices may include spell checks, grammar checks, word prediction, speech-to-text software, dictation, recording, sentence starters, story webs, concept webs, outlining tools, calculators, graphing calculators, software for problem solving skills, Computer-Aided Design (CAD), etc.	Between Groups	.748	2	.374	.24
	Within Groups	279.231	186	1.501	
	Total	279.979	188		
8.3 Vary ways to support practice and performance - Differentiated approaches, strategies, skills to achieve same outcomes, use diverse mentors to guide differentiation processes, gradual release of supports to increase independence, etc.	Between Groups	.001	2	.000	.00
	Within Groups	308.952	186	1.661	
	Total	308.952	188		
9.1 Guide & support effective goal setting - Use a variety of tools (e.g. prompts, scaffolds, models, guides, checklists) to support process of individualized and appropriate goal-setting, etc.	Between Groups	.137	2	.068	.04
	Within Groups	291.937	186	1.570	
	Total	292.074	188		
9.2 Support goal-related planning and strategy development - Use “stop & think” prompts, use checklists and templates to prioritize & sequence, model “thinkaloud” process, guide transition from long-term goals to short-term objectives, etc.	Between Groups	1.710	2	.855	.59
	Within Groups	267.528	186	1.438	
	Total	269.238	188		
9.3 Use tools to manage information & resources - Keep information organized and accessible with graphic organizers, templates, embedded prompts, checklists, note-taking guides, software tools, etc.	Between Groups	1.878	2	.939	.76
	Within Groups	229.931	186	1.236	
	Total	231.810	188		
9.4 Enhance capacity for formative progress self-monitoring - Develop self-monitoring through guided questions, frequent representations of progress, selfreflection templates, differentiated self-assessment strategies, etc.	Between Groups	3.754	2	1.877	1.26
	Within Groups	276.828	186	1.488	
	Total	280.582	188		
10.1 Options for methods - Discrete vs elaborative response (ie multiple choice vs essay), varied time allowance, individualized vs group or peer-supported, location varies w/in the curriculum, mbedding assessment opportunities, etc.	Between Groups	3.903	2	1.952	.88
	Within Groups	412.203	186	2.216	
	Total	416.106	188		
10.2 Options for formats - Visual information: photographs, pictures, picture-symbols, written, computer text, computer text-tospeech, video, kinesthetic supports (w low-tech), etc.	Between Groups	5.842	2	2.921	2.04
	Within Groups	265.692	186	1.428	
	Total	271.534	188		
Auditory information: Oral, technology-supported (taped, computer speech-to-text, voiced word processing, kinesthetic supports (w low-tech), etc.	Between Groups	3.991	2	1.996	1.23
	Within Groups	300.368	186	1.615	
	Total	304.360	188		

10.3 Options for scope/range/level - Choice in number of items, type of items. Choice in focus. Connects across levels. Tiered assessments - from “big idea”(all learners) to complex details (some learners), Multiple levels of understanding- concrete through synthesis, etc.	Between Groups	.104	2	.052	.034
	Within Groups	281.706	186	1.515	
	Total	281.810	188		
10.4 Options for product & outcome - Consider formative vs summative assessment. Consider authentic assessments with “real-world” products. Include differentiated products (e.g. plays, video productions, essays, point-of-view “rafts”, “tic-tac-toes”, debates, artistic productions, student-driven assessments, etc.)	Between Groups	.573	2	.287	.168
	Within Groups	318.093	186	1.710	
	Total	318.667	188		
10.5 Options for feedback - Teacher: acknowledgement, probing, challenging questions, positive feedback, detained response,real-time vs delayed, etc. Student: journals, writing, prompts, reflection, peer feedback, self-evaluation, self awareness, etc.	Between Groups	1.782	2	.891	.667
	Within Groups	248.578	186	1.336	
	Total	250.360	188		

Appendix 3 – ANOVA TABLE: Students by delivery

		Sum of Squares	df	Mean Square	F
1.1 Vary ways to display information: Visual information: size, contrast, color, layout, spacing, etc. Auditory information: amplitude, speed, timing, cueing, etc.	Between Groups	3.111	4	.778	.4
	Within Groups	354.052	185	1.914	
	Total	357.163	189		
1.2 Alternatives for auditory information - Text provided for spoken language, voice recognition-to-text, visual symbols for emphasis, sound alerts, etc.	Between Groups	4.365	4	1.091	.4
	Within Groups	405.551	185	2.192	
	Total	409.916	189		
1.3 Alternatives for visual information - Text or spoken equivalents for graphics/video/animation, tactile supports for visuals, Use of physical objects or spatial models, etc	Between Groups	5.551	4	1.388	.7
	Within Groups	332.917	185	1.800	
	Total	338.468	189		
2.1 Alternative access to key vocabulary & language - Pre-teach vocabulary & symbols, highlight components of complex words, embed vocabulary supports in text – hyperlinks, footnotes, definitions, etc.	Between Groups	11.357	4	2.839	1.6
	Within Groups	314.017	185	1.697	
	Total	325.374	189		
2.2 Clarify language structure & rules - Make rules & relationships explicit, clarify links between concepts, use less complex vocabulary or language structures, etc.	Between Groups	13.120	4	3.280	1.6
	Within Groups	373.854	185	2.021	
	Total	386.974	189		
2.3 Alternatives for text symbols & mathematical symbols - Text-to-speech programs for digital text, use digital math notations (Math ML) with voicing, use text alternatives (tapes, DVD, digital text) with human voicing, etc	Between Groups	19.228	4	4.807	2.1
	Within Groups	406.583	185	2.198	
	Total	425.811	189		
2.4 Provides connections across different languages - Key information in dominant and second languages, vocabulary definitions & pronunciations in both languages, shared/related roots identified, syntax/grammar links & differences identified	Between Groups	11.947	4	2.987	.8
	Within Groups	615.127	185	3.325	
	Total	627.074	189		
2.5 Use non-language alternatives for concepts - Present complementary representations (e.g. text with animation/graphics, etc.), link illustrations and verbal enhancements, make text-to-chart or diagram links explicit, etc.	Between Groups	5.307	4	1.327	.6
	Within Groups	381.645	185	2.063	
	Total	386.953	189		
3.1 Access background knowledge - Activate prior knowledge with imagery, concepts, etc., use organizers (KWL, concept maps, etc.), pre-teach concepts, “bridge” ideas with analogies & metaphors, etc.	Between Groups	8.444	4	2.111	1.2
	Within Groups	305.498	185	1.651	
	Total	313.942	189		
3.2 Highlight essential information & “big ideas” - Emphasize key elements, use organizer, prompts & cues to identify & connect key elements, use multiple examples and non-examples, mask or reduce extraneous elements, etc.	Between Groups	1.550	4	.387	.3
	Within Groups	209.903	185	1.135	
	Total	211.453	189		
3.3 Guide information selection & processing - Use interactive models, explicit prompts and scaffolds, develop multiple points-of-entry & pathways for content, chunk information, release information progressively, etc.	Between Groups	7.080	4	1.770	1.3
	Within Groups	244.084	185	1.319	
	Total	251.163	189		
3.4 Support memory & knowledge transfer - Checklists, sticky notes, electronic reminders, mnemonic devices, space out reviews, organizers for note-taking, connect new information & prior knowledge, embed analogies & metaphors, etc.	Between Groups	1.014	4	.254	.1
	Within Groups	293.349	185	1.586	
	Total	294.363	189		
4.1 Support individual choice & autonomy - Challenge levels, types of recognition used, vary content or context for learning, choice of information tools, design of products, timing & sequence of tasks, etc.	Between Groups	.729	4	.182	.1
	Within Groups	253.634	185	1.371	
	Total	254.363	189		
4.2 Make learning personally relevant & valuable - Activities personalized to students’ lives, socially relevant, age & ability appropriate, culturally & racially appropriate, active participation, authentic & purposeful outcomes, use of self-reflection, etc.	Between Groups	4.421	4	1.105	.6
	Within Groups	304.742	185	1.647	
	Total	309.163	189		
4.3 Reduce distractions and perceived threats - Vary novelty & risk-taking in activities & transitions predictability, scheduling, routines, novel events, etc.), vary sensory stimulation levels (background noise, # of items, etc.), vary pace & length of work sessions, vary social demands required for activities, etc.	Between Groups	4.973	4	1.243	.7
	Within Groups	290.269	185	1.569	
	Total	295.242	189		
5.1 Strengthen connection to goals and objectives - Develop explicit goals, restate goals for clarity, clearly display goals, develop sort-term objectives for long-term goals, use prompts to visualize & clarify outcomes, etc.	Between Groups	8.344	4	2.086	1.5
	Within Groups	247.599	185	1.338	
	Total	255.942	189		
5.2 Vary levels of challenge & support - Vary difficulty in core activities, use tools & scaffolds to provide alternatives, use collaboration, vary	Between Groups	2.912	4	.728	.5
	Within Groups	265.030	185	1.433	

ranges for acceptable work, emphasize process, effort & improvement, etc.	Total	267.942	189		
5.3 Support collaboration & communication with peers - Cooperative learning groups, clarify roles & responsibilities, positive behavioral supports, differentiated supports, peer tutoring & support systems, connect to virtual communities, etc.	Between Groups Within Groups Total	18.769 497.884 516.653	4 185 189	4.692 2.691	1.7
5.4 Focus feedback on effort, practice, and mastery - Encourage perseverance, self-awareness & self-efficacy, emphasize effort & improvement, give frequent, on-going, & substantive feedback, model evaluation strategies, etc.	Between Groups Within Groups Total	3.598 245.481 249.079	4 185 189	.899 1.327	.6
6.1 Support and guide personal goal-setting - Model goal-setting process, coach or mentor students in goal-setting, use prompts, rubrics, checklists, etc. to support self-regulatory goals, on-task behaviors, and self-reinforcements, etc.	Between Groups Within Groups Total	2.953 286.547 289.500	4 185 189	.738 1.549	.4
6.2 Develop individualized coping skills - Use differentiated models & feedback to develop skills e.g managing frustration, seeking emotional support, and developing internal controls, etc.	Between Groups Within Groups Total	8.060 331.708 339.768	4 185 189	2.015 1.793	1.1
6.3 Support self-monitoring and self-assessment - Use tools & models to collect & determine own behaviors (e.g. charts, recording devices, peers, etc.),build student self- awareness (and reduce scaffolds) over time, etc.	Between Groups Within Groups Total	7.520 323.322 330.842	4 185 189	1.880 1.748	1.0
7.1 Varied & alternative physical responses - Alternatives in rate, timing, amplitude, range-of-motion, materials, manipulatives, & technologies, allow response alternatives from standard means (e.g. computer response vs paper & pencil), etc.	Between Groups Within Groups Total	6.341 358.759 365.100	4 185 189	1.585 1.939	.8
7.2 Varied ways to interact with materials - Use multiple means of navigating materials (e.g. by hand, by voice, by switch, by keyboard, etc.)	Between Groups Within Groups Total	2.312 410.262 412.574	4 185 189	.578 2.218	.2
7.3 Use assistive technologies for access to learning - Determine appropriate technologies (physical, sensory, cognitive, communication) needed to access instruction, integrate training to support & enhance learning and goal achievement, etc.	Between Groups Within Groups Total	3.004 372.912 375.916	4 185 189	.751 2.016	.3
8.1 Vary choices for expression of knowledge - Choices may include text, speech, illustration, physical models, film, video, pictures, music, art, etc.	Between Groups Within Groups Total	3.284 298.211 301.495	4 185 189	.821 1.612	.5
8.2 Vary tools for composition & problem solving - Choices may include spell checks, grammar checks, word prediction, speech-to-text software, dictation, recording, sentence starters, story webs, concept webs, outlining tools, calculators, graphing calculators, software for problem solving skills, Computer-Aided Design (CAD), etc.	Between Groups Within Groups Total	1.583 280.885 282.468	4 185 189	.396 1.518	.2
8.3 Vary ways to support practice and performance - Differentiated approaches, strategies, skills to achieve same outcomes, use diverse mentors to guide differentiation processes, gradual release of supports to increase independence, etc.	Between Groups Within Groups Total	6.625 305.038 311.663	4 185 189	1.656 1.649	1.0
9.1 Guide & support effective goal setting - Use a variety of tools (e.g. prompts, scaffolds, models, guides, checklists) to support process of individualized and appropriate goal-setting, etc.	Between Groups Within Groups Total	7.256 287.460 294.716	4 185 189	1.814 1.554	1.1
9.2 Support goal-related planning and strategy development - Use “stop & think” prompts, use checklists and templates to prioritize & sequence, model “thinkaloud” process, guide transition from long-term goals to short-term objectives, etc.	Between Groups Within Groups Total	5.019 266.776 271.795	4 185 189	1.255 1.442	.8
9.3 Use tools to manage information & resources - Keep information organized and accessible with graphic organizers, templates, embedded prompts, checklists, note-taking guides, software tools, etc.	Between Groups Within Groups Total	1.502 232.293 233.795	4 185 189	.375 1.256	.2
9.4 Enhance capacity for formative progress self-monitoring - Develop self-monitoring through guided questions, frequent representations of progress, selfreflection templates, differentiated self-assessment strategies, etc.	Between Groups Within Groups Total	4.607 278.809 283.416	4 185 189	1.152 1.507	.7

10.1 Options for methods - Discrete vs elaborative response (ie multiple choice vs essay), varied time allowance, individualized vs group or peer-supported, location varies w/in the curriculum, mbedding assessment opportunities, etc.	Between Groups	.319	4	.080	.0
	Within Groups	418.950	185	2.265	
	Total	419.268	189		
10.2 Options for formats - Visual information: photographs, pictures, picture-symbols, written, computer text, computer text-tospeech, video, kinesthetic supports (w low-tech), etc.	Between Groups	4.399	4	1.100	.7
	Within Groups	269.812	185	1.458	
	Total	274.211	189		
Auditory information: Oral, technology-supported (taped, computer speech-to-text, voiced word processing, kinesthetic supports (w low-tech), etc.	Between Groups	5.884	4	1.471	.9
	Within Groups	298.516	185	1.614	
	Total	304.400	189		
10.3 Options for scope/range/level - Choice in number of items, type of items. Choice in focus. Connects across levels. Tiered assessments - from "big idea"(all learners) to complex details (some learners), Multiple levels of understanding- concrete through synthesis, etc.	Between Groups	3.918	4	.979	.6
	Within Groups	280.761	185	1.518	
	Total	284.679	189		
10.4 Options for product & outcome - Consider formative vs summative assessment. Consider authentic assessments with "real-world" products. Include differentiated products (e.g. plays, video productions, essays, point-of-view "rafts", "tic-tac-toes", debates, artistic productions, student-driven assessments, etc.)	Between Groups	11.605	4	2.901	1.7
	Within Groups	310.205	185	1.677	
	Total	321.811	189		
10.5 Options for feedback - Teacher: acknowledgement, probing, challenging questions, positive feedback, detained response,real-time vs delayed, etc. Student: journals, writing, prompts, reflection, peer feedback, self-evaluation, self awareness, etc.	Between Groups	3.395	4	.849	.6
	Within Groups	248.400	185	1.343	
	Total	251.795	189		

Appendix 4 – ANOVA Table - Students by classification

Begoña Pérez-Mira *is an Associate Professor of Business at Northwestern State University. Dr. Perez-Mira currently teaches Systems Analysis and Design, Web Development, International Business, Principles of Marketing, Marketing Research, Social Media Marketing, Search Engine Optimization, Consumer Behavior, Marketing Management, and Marketing Promotions. Her research interests include E-Commerce metrics, Search Engine Optimization, and technology supported disaster management.*

Brenda Hanson *is a Professor of Business Administration. Dr. Hanson currently teaches Business Statistics and Personnel Management. She received her M.A. from NSU in Higher Education Administration and her B.S. in Business Education at NSU. Dr. Hanson earned her Ph.D. in Vocational Education through the School of Human Resource Education and Workforce Development at Louisiana State University in Baton Rouge. Her research has been published in refereed journals and she has made numerous presentations internationally, nationally, regionally, and locally. Her areas of teaching and expertise are: management, business education, and office administration. She has prior work experience in insurance, banking and as a business teacher in Louisiana, Florida and Michigan*

Margaret S. Kilcoyne *is the director and a professor of business administration in the School of Business Northwestern State University in Natchitoches, Louisiana. She earned a Ph.D. at Louisiana State University. She has published in refereed journals and made numerous presentations internationally, nationally, regionally, and locally. Areas of teaching and expertise are: computer based education, microcomputer applications, business education, office information systems, business communications, computer literacy, and word processing.*

Tom Hanson *is a Professor of Mathematics and Computer Information Systems, and currently teaches College Algebra, Finite Mathematics, Operations Management, Fundamentals of Network Design, Principles of Information Systems, and Client Side programming using JAVA Script. He received his B.S. cum laude, M.A., and Ph.D degrees in Mathematics from the University of Georgia in Athens, GA. His research has been published in refereed journals and he has made numerous presentations internationally, nationally, regionally, and locally. His areas of teaching and expertise are: mathematics, network design, basic information systems, and program design and development. He has 17 years of prior work experience in information systems, marketing and sales, management, and manufacturing in the private sector in large and small corporate structures.*

Sue Champion *is an instructor of business administration in the School of Business Northwestern State University in Natchitoches, Louisiana. She earned a master's degree from NSU. She has published in refereed journals and made numerous presentations nationally, regionally, and locally. Areas of teaching and expertise are: computer based education, microcomputer applications, business education, office information systems, and word processing.*

Sarah Wright *is an assistant professor of computer information systems in the School of Business Northwestern State University in Natchitoches, Louisiana. She earned a master's degree in CIS from Nova Southeastern. Currently she is pursuing her Ph.D. Areas of teaching and expertise are: computer based education, microcomputer applications, mobile applications, and database.*

Carmella Parker *is an assistant professor of business law in the School of Business at Northwestern State University in Natchitoches, LA. Carmella Parker has been licensed to practice law in the State of Louisiana for over twelve years. Prior to working at Northwestern State University School of Business, she had the distinct opportunity to work as Field Counsel for the prestigious Liberty Mutual Group. This position was simply a natural outgrowth from working as an Assistant Attorney General assigned to the Risk Litigation Division for the Louisiana Department of Justice in New Orleans, and then Baton Rouge. She also is general counsel to a small business as well as a contract attorney for special projects. Ms. Parker has a B.S. in Business Administration, a Minor in Liberal Arts, and an Equivalent to a Minor in Latin from Louisiana Scholars' College at Northwestern State University. She earned her Juris Doctor as well as a Certificate of International Studies from Loyola College of Law in New Orleans, Louisiana. She also obtained her Master of Business Administration from the University of New Orleans.*

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Building College Enrollment through Enhanced Recruiting and Retention as a Result of Students Membership in a Living Learning Community Enhancing College Enrollment through Living Learning Communities

Jim Larsgaard, Eastern Kentucky University

Rationale

University [program] funding is in jeopardy due to many states' budget challenges, and as a result changes in states' funding of our universities. While this research has been conducted in the author's college (College of Justice and Safety), the principles and methodologies herein apply directly to Business Education programs, and their respective colleges.

Statement of the Problem

With the advent of reduction in state funding for higher education, universities are experiencing an ever-increasing dependency on students' tuition. For example, at this author's university state funding has been reduced from over 70 percent of the operating budget five years ago, to little more than 20 percent in 2015.

Therefore enrollment within our College's programs is taking on a greater responsibility of tuition funded operating. That greater responsibility on the need for tuition dollars results in a greater need for our programs to grow our enrollment.

Increasing program enrollment is achieved from two primary aspects. Those aspects are improving retention, and increasing and improving recruiting and enrollment foundations. This research addresses improving enrollment through a Living Learning Community (LLC) recruitment campaign that is also designed to increase overall incoming freshmen matriculation and retention through aggressively enriching our discipline specific Living Learning Community recruitment.

Living Learning Community Introduction

A range of academic literature continues to document the positive benefits of learning communities. Rosen & Davis (2014) cite multiple studies that reveal benefits of learning communities including increased rates of student retention, increased levels of student engagement (Oates & Leavitt, 2003; Tinto, 1998; Zhao & Kuh, 2004), and higher levels of student performance (Hegler, 2004; Henscheid, 2004; Huerta, 2009; Kuh, 2008; Stassen, 2003).

Further, another faculty member at the site university and this author have developed and implemented a curriculum for our LLC. However, this proposal deals with only the recruitment aspect for the site university/college LLC, and the matriculation rate to the college.

While there is little question about the benefits of LLCs for our students, a looming question remains in that little research has been conducted regarding recruitment efforts that will positively impact not only the number of students in our LLC, but as an additional benefit, positively impact our College's overall incoming freshmen matriculation rate. The LLC for this author's college is housed with LLC members living on five floors of one of the on-campus residence halls. The on-campus residence adds yet another retention-positive aspect to the LLC.

Purpose of the Study

This research is designed to determine the effectiveness of a targeted recruitment campaign for our College's incoming freshmen to guide them into our Living Learning Community. Further, this study will also identify whether or not the overall matriculation rate of the entire admitted (as of February 2015) incoming freshmen population, which is historically about 35 percent, will change, as a result of the recruitment campaign.

Methodology and Procedures

Included in the university application process, prospective students are requested to list their phone number, their [current] e-mail address, and their United States Postal Service (USPS) mailing address. That data provides the university with an opportunity to communicate with the student applicants via three modes (i.e., text, e-mail, and USPS mail).

Considering the specific information for each of the three modes of interpersonal communication provided by each applicant, this author developed a three tiered recruitment campaign targeted to our incoming freshmen, who were admitted as of February 1, 2015. The three tiered campaign included text, e-mail, and USPS mailing. Messages for each of those tiers was developed, and funding for production and delivery for all three was requested from the Dean.

The cost/benefit analysis for the recruitment campaign revealed a very strong likelihood of resulting in a positive cash flow. There were 580 students admitted as of February 2015, and 350 of them had opted in to texting. The text messages cost $.10 per student for a total cost of $35. E-mail was free, and the brochure quote from our university printer was for $2.77 each [for 600 brochures], which included printing and mailing for a total brochure cost of $1,662. The resulting grand total cost of $1,697. As a result, one additional student for one term would cover the cost of this campaign. The funding request was granted.

In preparation for the February launch of the recruitment campaign, the first step was to request our college Director of Marketing to join this author at an LLC event in early December, 2014 to take pictures. With the pictures taken by the Marketing Director, and with the assistance of one of our college's graphics designers, this author developed a tri-fold brochure that

highlighted the benefits of our college's LLC. Those benefits include, but are not limited to current LLC member testimonials relating: the security of being with other students who are in our college's majors, the opportunities to become involved in college and university activities with their classmates, connectedness resulting from the common interest in specific majors, making friends, finding study partners, and more.

Further, being mailed to the students' homes would have resulted in many of the parents seeing the brochure and feeling confident and secure that our college, and our LLC are the best post-secondary education choice for their daughter or son. Additionally, a text message and an informative e-mail were developed.

The text message was short and direct. It requested that the recipient check his/her e-mail the (s)he listed when (s)he applied to be admitted. Then an e-mail was developed to be sent with the launch of the recruitment campaign. Not only does the e-mail tout the benefits of our LLC, but also it touts benefits of being a student in our college. Additionally there are multiple how to items (e.g., how to apply for our LLC) included in the e-mail, and many of the information items have live links to the topic specific Web page, and that e-mail is detailed in Appendix A. With the preparation of the three tiers of the recruitment campaign developed, the campaign was launched in February 2015.

On the same day in early February 2015, all 350 admitted students were sent the text message, all 580 admitted students were sent the e-mail message, and brochures were sent to the homes of all 580 people admitted as incoming freshmen.

Findings and Results

As the fall 2015 semester approached, exciting incoming freshmen numbers were revealed. While the only new recruitment activity for the incoming freshmen was our recruitment campaign, our LLC population increased from a static historic approximate 130 members to 148 members. The 18 member increase in LLC enrollment equaled nearly a 14 percent increase. Additionally, our matriculation increased from a static historic approximately 32 percent to a university record 48 percent.

Conclusions and Recommendations

It is clear that establishing communication with incoming freshmen at a strategic time ahead of the start of classes is productive in terms of LLC enrollment and matriculation rate. However, the timing of that communication is an aspect that requires further research. If the communication is too early, some students who will apply for admission will not be contacted. If that communication is too late; some students who may have matriculated to the site university with the information, will make the decision to matriculate to another university.

Therefore, this author will do a data analysis on the timing of students submitting their applications for admission to the site university, and make a timing decision for the launch of next year's campaign, based in part on that application timing.

Appendix A
E-mail to CJS Fall 2015 Admitted Incoming Freshmen

Subject: SITE UNIVERSITY's College of Justice & Safety LLC Wants You!

Dear (student), Welcome to the site university:)

We in site university's College of Justice & Safety are excited that you are becoming a part of this College!

Now, please consider taking advantage of a great opportunity in your College of Justice and Safety (CJS). That opportunity is the CJS Living Learning Community (LLC) in Keene Hall. In the LLC you will be living on the same floor with other students like you, who are enrolled in the College of Justice and Safety.

Research indicates that **students who live in living-learning communities graduate at higher rates**, maintain higher grade point averages, become more involved in campus activities, build lifelong relationships, and strengthen their leadership skills.

Here is what students say about the Living and Learning Community:

- We live and study with students who share similar academic and social interests.
- I can bond with fellow SITE UNIVERSITY Justice & Safety students and faculty through events like "Pizza with Professors!"
- I find personal support and assistance close by from professional residence hall staff who are ready to help me at any time.

To learn more about the Justice and Safety learning community go to: http://housing.site university.edu/justice-and-safety

To learn more about Keene Hall to go to: http://housing.site university.edu/keene-hall

Housing assignments are made on a space available and date of deposit received basis. Students who apply early get priority on room assignments, so **reserve your place today**!

Please note that the housing application will ask you to get a copy of the LLC special requirements. The College of Justice and Safety LLC has no special requirements. However, as a member of any LLC at SITE UNIVERSITY, you will be asked to participate in a minimum of one activity per month, and complete a survey.

For more information about how to apply Visit: http://housing.site university.edu/future-residents and then click on "How Do I APPLY**?"**

Finally – Watch your US mailbox! Information about Eastern Kentucky's College of Justice and Safety and the associated Living Learning Community will arrive in a couple of days!

If you have any questions, reply ….

Dean's Signature

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Dr. Jim (James) Larsgaard currently works for the Dean at Eastern Kentucky University (EKU) College of Justice and Safety. He performs data analytics, data reporting, program evaluation and retention, and other administrative tasks. Jim also taught Computer Information Systems at EKU for several years. He has a B.S. from North Dakota State University, MBA from the University of North Dakota, and Ed.D. from the University of Kentucky. Jim has been Program

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