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Theme-Based Courses Foster Student Learning and Promote Comfort with Learning New Material

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Abstract:

In this article, we review the literature about theme-based teaching, then report quantitative and qualitative results from surveys from three different courses: one section of a 100-level in-person art course; five sections of 300-level on-line art courses; and one section of a 100-level in-person biology course at SUNY Delhi with applied themes (“food,” “healthcare,” and “beer” respectively) in teaching and learning. Our results indicate that embedding themes across an entire course can be a successful way to improve student perceptions of their learning and comfort with learning about new subjects. These data expand current gaps in the literature with respect to the measured benefits for students of adopting themes in college teaching and learning. They will be useful to teachers considering the use of themes in their courses and to anyone looking for a way to help students relate to the disciplines in their courses.

Students sometimes enter new courses with a bit of fear and anxiety (Bledsoe & Baskin, 2014). If students are required to take subjects outside their perceived scope of expertise or career interests, as is often the case with parts of General Education requirements, that level of anxiety may be heightened. In addition, taking such courses sometimes leads to students questioning why they need to take classes that they believe are not relevant to their life or major. This study explored whether using a theme perceived as “accessible” or meaningful to students could improve student perceptions of their mastery of new subject knowledge and/or improve their overall feelings about studying the “new” subject.

Literature Review

The topic of thematic-approaches is not universally applied and defined, and the level of application varies greatly from the macro-scale initiatives across campus to the micro-level use of a theme for one unit of study. Numerous subtle variations were found in the terminology used in the literature including the following: “integrative theme” (Barma & Bader, 2013), “thematic approach” (Lung, 1999; Handal & Bobis, 2004), “thematic program” (Lung, 1999), “thematic teaching” (Lipson, Wixson, & Peters, 1993), “thematic instruction” (Handal & Bobis, 2004), “themed courses” (Mangan, 2014), and “teaching [subject] thematically” (Handal & Bobis, 2004). Handal (2001) defines a thematic-approach in mathematics as “an umbrella term for a wide range of educational experiences that relate mathematics to real life situations” (as seen in Handal and Bobis, 2004), which should “facilitate experiential and situated learning and bring personal meaning and direction to the learning process” (Handal & Bobis, 2004). Furthermore, Handal and Bobis (2004) distinguish thematic instruction that is focused on “applications” of a subject connected to the overarching theme, from topical teaching where the emphasis is on subject “content.”

Scholars have articulated the rationale for using a theme based approach as a “meaningful” way to personally engage students in the learning process (Handal & Bobis, 2004; Lipson, et al., 1993); connect to students’ life experiences, interests, and existing knowledge bases (Handal & Bobis, 2004; Lipson, et al., 1993; Mangan, 2014); create a focus for learners that reveals connections among knowledge areas (Lipson, et al., 1993); promote positive attitudes in learners (Lipson, et al., 1993); and improve student success/achievement (Handal & Bobis, 2004; Mangan, 2014). Mangan (2014) reports increased student performance in theme-based classes, citing an 87% pass rate in “fear and horror” themed introductory English classes at a community college, compared to a 78% pass rate in traditional versions of these classes across the Texas community college system.

The benefits of a thematic approach have been outlined in the literature largely by observational and anecdotal reports. Authors point out a lack of data to quantify each benefit and are fast to also express concerns about adopting this method of teaching and learning. Handal and Bois (2004) note conflicting evidence in the literature regarding the supposed benefits of teaching thematically. In addition, Lipson, et al. (1993) report that there is little information about how to thoughtfully adopt a thematic approach in teaching language arts, and, similarly, Handal and Bobis (2004) describe the guidelines for thematic teaching in mathematics as “vague.” Handal and Bobis’ (2004) research reveals that secondary mathematics teachers using thematic teaching described obstacles for implementing this method at the instructional,

curricular, and organizational levels. Due to the dearth of conclusive information, Lipson, et al. (1993) caution against carelessly choosing non-thought provoking themes that are superficially applied (“themes of convenience”) without strong integration into the study subject and specific objectives and activities clearly connected to the theme. Handal and Bobis (2004) advocate for more quantitative studies on student perceptions of this form of teaching, and assessment of the impact of thematic teaching on student success. This study attempts to address this gap in the literature by providing quantitative and qualitative data for student perceptions of theme-based learning.

Our discussion includes classes that have adopted three different themes to teach two different subjects to undergraduate students: “healthcare” to teach art to nursing students; “food” to teach art to students with different majors, and “beer” to teach biology to students with different majors. The literature we have reviewed reveals an emphasis on integrating the humanities into systems of medical education, such as in Auerbach & Baruch, 2012; Bardes, Gillers & Herman, 2001; Inskeep & Lisko 2001; Jacques, Trinkley, Stone, Tang, Hudson, & Khandelwal, 2012; Osmond, et al., 2012; Pardue, 2005; Pellico, Friedlaender, & Fennie, 2009. With respect to integrating the visual arts, healthcare students are typically taken to museums and exposed to visual analysis and interpretation skills with the goal of enhancing inspection and diagnosis skills (Bardes, Gillers & Herman 2001; Inskeep & Lisko 2001; Jacques, et al., 2012; Pardue, 2005; Pellico, Friedlaender, & Fennie, 2009). Other hypothesized benefits of exposing medical students to art include appreciation for the value of collaboration and alternate viewpoints (Inskeep & Lisko, 2001; Jacques, et al., 2012; Pardue, 2005; Pellico, Friedlaender, & Fennie, 2009), strengthening of critical thinking skills (Inskeep & Lisko, 2001; Jacques, et al., 2012;), and promotion of humanistic and empathetic approaches to care (Bardes, Gillers & Herman 2001; Jacques, et al., 2012; Pardue, 2005). Few of the reviewed studies promoting the integration of visual arts education into nursing education offered empirical evidence of how such efforts positively impact future healthcare providers. An exception is Pellico, Friedlaender, and Fennie, (2009) in presenting data that nursing students who engaged in a museum sponsored visual arts activity significantly improved their quantity of observations, outlined more clinical findings, and arrived at a greater number of diagnoses than their control counterparts. Similarly, Bardes, Gillers & Herman (2001) report that students given the task of examining the same patient photograph before and after completing a program at a museum created more precise written analyses with increased supported inferences in the post-tests and perceived such activities as improving their skills in observation, description, and interpretation (Bardes, Gillers & Herman, 2001). It is important to note that many of the reviewed initiatives, with the exception of Auerbach & Baruch (2012), involve providing nurses and doctors limited exposure to the humanities via accessing art museums for discrete activities rather than efforts to promote a prolonged course-length exposure (Bardes, Gillers, & Herman, 2001; Inskeep & Lisko, 2001; Jacques, et al., 2012; Pellico, Friedlaender, & Fennie, 2009, Pardue, 2005). Thus, the case for integrating the humanities into the education of medical students is well made, but room for more research about the achieved benefits of comprehensive exposure to the humanities is needed.

The theme of food has been integrated into the college curriculum in cross-disciplinary first-year seminars (Hall, 2013) and in cross-disciplinary projects and activities from planned clusters of courses designed to meet general education distributions (Wingert, Wasileski, Peterson, Mathews, Lanou, & Clarke, 2011). Hall (2013) feels that the seminars were

transformative for some students in their daily life decisions regarding ethically and sustainably viable food choices, but data were not reported. Wingert, et al. (2011) used pre- and post-surveys and discovered that the food-themed projects and activities increased student attention to civic engagement opportunities with respect to food issues; developed student understanding of food systems, choices, sociological and biological relationships with food; and improved academic skills in the areas of food literacy, research literacy, and information and communication skills pertaining to food. The qualitative analyses from this study revealed that the program helped reinforce pre-existing student interests (Wingert, et al., 2011).

Finally, themes have also been successfully integrated into science education. Lung (1999) reports that the goals of adopting a theme in the sciences include: increasing relevancy, focusing on processes, integrating units, fostering “higher order” thinking, and moving beyond the confines of one text. Lung (1999) used a hypothetical malaria outbreak in an African village as a theme for an entire semester of college and high school biology classes and reported anecdotally that students found the course “challenging,” “fun,” and “useful,” resulting in improved attitudes. Barma and Bader (2012) studied a high school science teacher who adopted a theme of the health risks of tanning salons to teach sciences with the hope of relating to the everyday lives of students to promote motivation. They report that the teacher initially expressed anxiety about planning for the theme integration and the logistical complexities that arose, but ultimately felt that student interest increased; connections were made with community partners and parents; and critical thinking skills were fostered to promote students to make better choices about their own health (Barma & Bader, 2012). In one case, the theme of beer was adopted by a college chemistry teacher as a way to highlight the meaning of sciences to non-science majors (Pelter, 2006). In end of the semester surveys, students reported that the class was fun and that the topic increased their interest in the subject (Pelter, 2006). Qualitative data revealed that students found the class learning applicable and relevant (Pelter, 2006).

In summary, a few studies have focused on the value of applying themes embedded across a semester long college course. While the rationale of using a theme-based approach is advocated in the literature, few quantitative and methodical qualitative studies report the actual impact of thematic teaching on student perceptions of study subjects or on perceptions of knowledge attainment in the course. This investigation attempts to contribute to the literature by documenting student perceptions of the impact of well-integrated and prolonged use of themes at the college course level.

Methods

The objectives of this study are to assess whether learning "new" or an unfamiliar study subject (art or biology) with a thematic approach (including the themes of healthcare, food, and beer) impacts student learning as measured by their perceived competency with learning objectives and indications of comfort level with the new subject material. We used pre-and post-class surveys from seven sections of three separate SUNY-Delhi classes that used a thematic approach throughout an entire session of learning (Table 1). The themes were carefully selected to capture undergraduate interest and/or to tie to students' majors (healthcare theme for nurses, and food or beer for culinary/hospitality majors).

Table 1.

Summary of courses involved in the theme-based learning study at SUNY Delhi, Delhi, NY USA.

<u>Course</u>	<u>Description</u>	<u>Number of sections sampled</u>	<u>Format</u>	<u>Applied theme</u>	<u>Student background</u>	<u>Professor's reflection on the degree of integration of the theme</u>
ARTS 300, Art and Health	This art course surveys basic art principles and concepts together with their historical development as shown in representative artworks tied to healthcare.	5	On-line, condensed 7-week session	Health care	Undergraduate nursing students who have already completed RN degrees and are working on BSN degrees 88% female 12% male	High
BIOL 150, Biology of Beer	This biology course covers the topics of general biology as they relate to beer. Laboratory includes inquiry- based study of beer brewing.	1	On-campus, full semester	Beer	Undergraduate students from mixed majors 70% female 30% male	High
HUMN 101, Art Appreciation	This art course surveys basic art principles and concepts together with their historical development as shown in representative works of painting, sculpture, drawing, landscape architecture and architecture.	1	On-campus, condensed 7-week session	Food	Undergraduate students from mixed majors 44% female 56% male	Low

Five sections of a seven-week on-line course, ARTS 300, Art and Health, were sampled with an average of 16 students per section. This course uses a deeply embedded theme of healthcare to teach new skills and content about art to nursing majors (Bachelor of Science in Nursing students). Images were selected to relate specifically to healthcare along the topics of art used for direct healing, educating practitioners, recording historical medical events, using therapy, reforming the medical system, memorializing and grieving, and exploring new frontiers

in the medical field. Students simultaneously studied the parallel developments in healthcare and the arts. For the nurses, the course theme related directly to their career goals.

One section of the full-semester on-campus course, BIOL150, Biology of Beer, was sampled. In this course, the theme of beer is integrated to teach biological concepts, which included basic chemistry, organic chemistry, cellular structure and function, genetics, inheritance, evolution, biodiversity, ecology, and the effects of alcohol on the body and society. This course is taken by undergraduates in a variety of programs as a Natural Science general education course. Five of the 18 post-participants were culinary/travel/hospitality majors, and the theme of beer may have related to their career interests. To the other young college students, the theme of beer is one that may interest them on a personal level.

Finally, HUMN 101, Art Appreciation, was taught as a 7-week, B-Session, which starts mid-semester and is often used by students who need to add a course to their schedules. That year, the college adopted a food theme for its campus programming, which was lightly interwoven into the beginning of each class by focusing on one food related artwork from the period or culture being discussed for the day. As most of the HUMN 101 class time was not focused on the food theme, this course used the theme to a lesser extent than the other two. One culinary/hospitality major was included in the 17 respondents, so the food theme connected directly to his/her career goals. Overall, this course was distinctive in its less extensive degree of integration of the theme and in having fewer students of a major with a connection to the given theme. Therefore, it served as control treatment with a low-level of theme integration.

SUNY Delhi Institutional Review Board (IRB) approval was obtained prior to the start of the study. At the onset of the project, students were provided a description of the study and told that their participation was voluntary and would not impact their grades in the class. They were informed that the data collection process and reporting of results would protect their anonymity. (Names were not collected on the surveys.) Students were read (where applicable) and provided with a written informed consent form per IRB protocol.

Pre- and post- semester surveys composed of quantitative and qualitative questions were administered in the seven classes (Appendices 1 & 2). The surveys for each of the three different courses were approximately the same, with the term “art” or “biology” and the applied theme substituted accordingly. A few questions were tailored to the specific course and are indicated with an asterisk in the appendices. The Pre- and post- questions were nearly identical so that data could be compared against the independent variable of time.

For questions 6 and 10, responses of “passionate” received 3 points, with 1 point for “not interested at all.” For questions 7-9, 11, 13, and 14, “yes” responses received 3 points, “maybe/somewhat” 2 points, and “no” 1 point. For question 12, responses of “very comfortable” received 3 points, down to one point for “not comfortable at all.” Questions 15-16 and the scoring of objectives received 3 points for “very knowledgeable,” 2 points for “somewhat knowledgeable” and 1 point for “not skilled or knowledgeable at all yet.”

Minitab version 16 (Minitab, Inc., State College, PA USA) was used for quantitative analysis. Statistical significance of differences was determined using a Type 1 error probability of $\alpha = 0.05$. A t-test was used within each course and across the entire dataset to compare the pre- and post- survey data. Analysis of course objectives was done for each course individually rather than collectively since course objectives were unique for each class. An abbreviated form of

"The Grounded Theory Approach" (Glaser and Strauss, 1967; Charmaz, 1983) was used as a framework for the qualitative analysis whereby textual data was "coded" on a sentence by sentence basis, cross-codes were observed, and over-arching themes emerged and then deductively checked against more and more data through the "constant comparative method" (Taylor and Bogdan, 1998).

Results

One hundred ninety surveys were voluntarily completed in total. HUMN 101 was comprised of 18 students, and 17 pre-and post-semester surveys were collected. ARTS 300 consisted of five sections for a total of 78 students; 75 pre-semester surveys and 47 post-semester surveys were submitted. BIOL 150 had 20 students; 16 pre-semester surveys and 18 post-semester surveys were returned. A lower-response rate (just over 60%) was found in the on-line ARTS 300 course format post-semester than in the face-to-face classes. Quantitative results are presented first, followed by a summary of qualitative results.

For the full-data set, a number of statistically significant results were found in comparing the pre- and post- surveys among all of the courses (Tables 2 & 3). There was a significant increase in positive emotions toward the study subject as indicated in described comfort level in discussing the subject and reported liking of the subject. Furthermore, in all of the classes, student perceptions of their knowledge level with both the study subjects and the themes, increased. A significant increase was found with respect to perceptions of how the subject connected to the theme in all of the classes, in which the themes were reported statistically as well integrated.

Table 2:

Quantitative results of pre- and post-surveys regarding themes and subjects in thematic classes. Statically significant differences are in bold. Data are the mean (standard error).

Comparison	Full Data Set	ARTS & BIOL	HUMN	ARTS	BIOL
How do you feel about the theme?	Pre: 2.62 (0.05) Post: 2.64 (0.58) T = -0.24 P = 0.814	Pre: 2.66 (0.06) Post: 2.73 (0.06) T = -0.84 P = 0.401	Pre: 2.62 (0.05) Post: 2.64 (0.06) T = -0.24 P = 0.814	Pre: 2.67 (0.06) Post: 2.85 (0.06) T = -2.20 P = 0.030	Pre: 2.71 (0.06) Post: 2.73 (0.06) T = -0.84 P = 0.401
Does the theme relate to your chosen career-choice?	Pre: 2.55 (0.08) Post: 2.44 (0.09) T = 0.94 P = 0.351	Pre: 2.77 (0.06) Post: 2.66 (0.09) T = 1.04 P = 0.301	Pre: 2.55 (0.08) Post: 2.44 (0.09) T = 0.94 P = 0.351	Pre: 2.99 (0.01) Post: 3.00 (0.00) T = NA P = NA	Pre: 2.77 (0.06) Post: 2.66 (0.06) T = 1.04 P = 0.301
Do the visual arts/biology connect to the theme?	Pre: 2.40 (0.06) Post: 2.75 (0.05) T = -4.24 P < 0.0001	Pre: 2.43 (0.06) Post: 2.76 (0.06) T = -3.72 P < 0.0001	Pre: 2.40 (0.06) Post: 2.75 (0.05) T = -4.24 P < 0.001	Pre: 2.31 (0.07) Post: 2.81 (0.06) T = -5.56 P < 0.0001	Pre: 2.43 (0.06) Post: 2.76 (0.06) T = -3.72 P < 0.0001
Could you use the visual arts/biology in your chosen career?	Pre: 2.33 (0.07) Post: 2.51 (0.08) T = -1.68 P = 0.094	Pre: 2.32 (0.07) Post: 2.60 (0.08) T = -2.57 P = 0.011	Pre: 2.33 (0.07) Post: 2.51 (0.08) T = -1.68 P = 0.094	Pre: 2.31 (0.08) Post: 2.87 (0.06) T = -5.57 P < 0.0001	Pre: 2.32 (0.07) Post: 2.60 (0.08) T = -2.57 P = 0.011
How do you feel about the visual arts/biology?	Pre: 2.13 (0.04) Post: 2.26 (0.05) T = -1.92 P = 0.057	Pre: 2.08 (0.04) Post: 2.22 (0.06) T = -1.98 P = 0.050	Pre: 2.13 (0.04) Post: 2.26 (0.05) T = -1.92 P = 0.057	Pre: 2.05 (0.04) Post: 2.28 (0.07) T = -2.73 P = 0.008	Pre: 2.08 (0.04) Post: 2.22 (0.06) T = -1.98 P = 0.050
Do you have a personal connection to the visual arts/biology?	Pre: 1.58 (0.07) Post: 1.72 (0.08) T = -1.25 P = 0.211	Pre: 1.56 (0.08) Post: 1.68 (0.09) T = -1.01 P = 0.312	Pre: 1.58 (0.07) Post: 1.72 (0.08) T = -1.25 P = 0.211	Pre: 1.43 (0.09) Post: 1.70 (0.10) T = -1.25 P = 0.216	Pre: 1.56 (0.08) Post: 1.68 (0.09) T = -1.01 P = 0.312
How comfortable are you with discussing visual art/biology?	Pre: 1.76 (0.07) Post: 2.19 (0.06) T = -4.83 P < 0.0001	Pre: 1.68 (0.07) Post: 2.09 (0.05) T = -4.64 P < 0.0001	Pre: 1.78 (0.07) Post: 2.19 (0.06) T = -4.83 P < 0.0001	Pre: 1.53 (0.07) Post: 2.13 (0.07) T = -6.12 P < 0.0001	Pre: 1.68 (0.07) Post: 2.09 (0.05) T = -4.64 P < 0.0001
Would you enjoy going to an art museum/professional biology conference?	Pre: 2.51 (0.07) Post: 2.59 (0.08) T = -0.74 P = 0.459	Pre: 2.45 (0.07) Post: 2.52 (0.10) T = -0.62 P = 0.539	Pre: 2.51 (0.07) Post: 2.59 (0.08) T = -0.74 P = 0.459	Pre: 2.56 (0.07) Post: 2.92 (0.05) T = -3.96 P < 0.0001	Pre: 2.45 (0.07) Post: 2.52 (0.10) T = -0.62 P = 0.539
Do you like the visual arts/biology?	Pre: 2.51 (0.05) Post: 2.77 (0.05) T = -3.43 P = 0.001	Pre: 2.48 (0.06) Post: 2.77 (0.06) T = -3.48 P = 0.001	Pre: 2.51 (0.05) Post: 2.77 (0.05) T = -3.43 P = 0.001	Pre: 2.49 (0.07) Post: 2.85 (0.07) T = -3.97 P < 0.0001	Pre: 2.48 (0.06) Post: 2.77 (0.06) T = -3.48 P = 0.001
How would you describe your overall knowledge level of the visual arts /biology?	Pre: 1.38 (0.05) Post: 2.05 (0.05) T = -9.55 P < 0.0001	Pre: 1.31 (0.05) Post: 1.99 (0.05) T = -9.68 P < 0.0001	Pre: 1.38 (0.05) Post: 2.05 (0.05) T = -9.55 P < 0.0001	Pre: 1.18 (0.05) Post: 1.94 (0.06) T = -10.51 P < 0.0001	Pre: 1.31 (0.05) Post: 1.99 (0.05) T = -9.68 P < 0.0001
How would you describe your overall knowledge level of the theme?	Pre: 2.45 (0.06) Post: 2.64 (0.06) T = -2.36 P = 0.019	Pre: 2.50 (0.06) Post: 2.70 (0.06) T = -2.31 P = 0.022	Pre: 2.45 (0.06) Post: 2.64 (0.06) T = -2.36 P = 0.019	Pre: 2.58 (0.06) Post: 2.85 (0.05) T = -3.24 P = 0.002	Pre: 2.50 (0.06) Post: 2.70 (0.06) T = -2.31 P = 0.022
Was the theme well integrated into the class?	2.85 (0.04) [2.77 - 2.94]	2.94 (0.03) [2.88 - 3.00]	2.85 (0.04) [2.77 - 2.94]	2.92 (0.04) [2.84 - 3.00]	2.94 (0.03) [2.88 - 3.00]

Table 3:

Quantitative results of pre- and post-surveys for learning objectives in three different thematic classes. Statistically significant differences are in bold. Data are the mean (standard error).

<u>Comparison</u>	<u>HUMN</u>	<u>ARTS</u>	<u>BIOL</u>
Please indicate if you CURRENTLY feel knowledgeable of or capable of completing each of the following objectives:			
Objective A	Pre: 1.52 (0.06) Post: 1.41 (0.06) T = 1.34 P = 0.182	Pre: 1.33 (0.06) Post: 2.55 (0.09) T = -12.07 P < 0.0001	Pre: 1.47 (0.06) Post: 2.48 (0.07) T = -10.96 P < 0.0001
Objective B	Pre: 1.41 (0.06) Post: 2.41 (0.06) T = -11.65 P < 0.0001	Pre: 1.21 (0.05) Post: 2.40 (0.08) T = -12.14 P < 0.0001	Pre: 1.35 (0.06) Post: 2.39 (0.07) T = -11.04 P < 0.0001
Objective C	Pre: 1.36 (0.06) Post: 2.36 (0.06) T = -11.87 P < 0.0001	Pre: 1.15 (0.04) Post: 2.35 (0.08) T = -13.17 P < 0.0001	Pre: 1.32 (0.06) Post: 2.38 (0.07) T = -11.52 P < 0.0001
Objective D	Pre: 1.62 (0.07) Post: 2.55 (0.06) T = -10.03 P < 0.0001	Pre: 1.38 (0.06) Post: 2.53 (0.09) T = -10.96 P < 0.0001	Pre: 1.57 (0.08) Post: 2.57 (0.07) T = -9.79 P < 0.0001
Objective E	Pre: 1.78 (0.07) Post: 2.69 (0.05) T = -10.18 P < 0.0001	Pre: 1.56 (0.07) Post: 2.73 (0.07) T = -11.89 P < 0.0001	Pre: 1.72 (0.08) Post: 2.70 (0.06) T = -9.97 P < 0.0001
Objective F	Pre: 1.71 (0.17) Post: 2.35 (0.12) T = -3.16 P = 0.004	NA	NA
Objective G	Pre: 2.06 (0.16) Post: 2.47 (0.12) T = -2.03 P = 0.051	NA	NA

A few significant differences were found between the classes. Unique to the combined data from ARTS 300 and BIOL 150, additional growth was not found in the HUMN 101 subset. In both ARTS 300 and BIOL 150, a significant difference was found, with students expressing in the post-surveys that they could use the subject in their selected careers. In these two classes, there was also significant improvement in reported feelings of increased passion/interest about

the study subject. Finally, while each course had unique objectives, there was a significant increase in perceived understanding of each of the course's objectives, whereas in HUMN 101, significant increase was found in only five of the seven course objectives (Table 3).

Data from ARTS 300 provided a few more significant differences that were not found elsewhere. First, significant improvement was found post-semester in student feelings about the actual theme of healthcare. Also, unique to ARTS 300, a statistical increase in predicted enjoyment of attending an art museum was found where it was not in HUMN 101. In BIOL 150, there was no significant difference in post-semester reports of perceived enjoyment from attending a professional biology conference. No significant difference was found in any of the three courses for feelings about how a theme relates to chosen careers. In addition, no significant difference was found in students' reported personal connections to the study subjects in any class.

Comparing pre- and post-semester qualitative data yielded insights into students' changing thoughts about the study subjects, their emotions about learning, their perspectives on mastering course objectives, and evaluations of the benefits of the theme on their learning. In explaining pre-semester their thoughts on art, students often expressed a limited view of the field by listing specific nouns such as "paintings," "drawings," "museums," "beauty," and "creativity," or famous pieces/artists. Fewer students defined art as a process of expression or included more than beautiful objects in their definitions. A few students commented pre-semester specifically about their fear and perceived lack of understanding of art, as exemplified here: "As a person who is not very interested in art, the word makes me feel a sense of dread . . . 'Art' makes me feel like I'm about to enter uncharted waters, since I know little about it and have never had much interest to." In describing their pre-semester thoughts on biology, about half of the students adequately defined biology as the "study of life," or the "science of life, animals, and ecosystems." The others stressed only nouns like "cells," "DNA," "the body," or defined biology as an undistinguished "science." A couple gave a sense of anxiety by defining the field as "a lot of work."

Post-semester, some respondents remained fixated on nouns in describing the study subjects, but most revealed a richer, multi-dimensional view of the subjects that included concepts, processes and skills. Many wrote that their views changed positively, and/or their levels of appreciation increased in their post-semester definitions of "art." As one student explained, "At the beginning of the semester I felt that art had to be something beautiful to look at, and that was about it." Post-semester definitions included a wider scope of media and intent, as evidenced in the following statements: "Art can be just about anything including buildings, sculptures, gardens and the usual painting. It can be pleasing to the eye, or initiate some emotional response. My definition has become much broader since beginning the course." Some wrote about how they can use the tools (elements, principles, supported interpretations, periods and styles) they had learned to explore art in a more robust fashion or commented how their observation skills were improved as indicated here: "I . . . look at color schemes, shapes, lines and more details that I did not notice prior to taking this class." Some felt that their appreciation for art increased. Example: "My respect for art has increased." Interestingly, a few wrote about how they might use art or connect it to other disciplines in their post-semester definitions. Consider the following post-semester reflections: "After going to this class I think of art in a whole different sense. At first I did not really think it had anything to do with healthcare

but . . . now, I can see how it could be used”; “I think of creativity and inspiration as well as science”; and “ . . . art is therapeutic in many ways.” In BIOL 150 post-semester, students continued to use terms such as “living” and “life,” and two participants connected the field to the human body. One student explained how he/she formed a connection between the study subject and theme stating, “I know that a lot of living things go into making beer.” In both the arts and biology classes students stated that they were more comfortable in their post- definitions. An ARTS 300 student wrote, “ . . . now I don’t cringe or think of being bored.” Similarly, three BIOL 150 students wrote about how engaging the course was. One commented, “Science= boring; but fun after this class,” and another wrote he/she had once perceived the field as “not fun, [but I] changed my mind. The teacher made it interesting.”

At the onset of the study, when asked specifically about their feelings about the study subjects, students expressed a wide-range of different emotions. Most of the students in HUMN 101 expressed that they were “excited” and “interested.” In BIOL 150, most of those surveyed indicated excitement in the pre-surveys, while one added that the theme increased positive emotions stating he/she was “excited because it has beer.” A couple of BIOL 150 students indicated feeling ambivalent toward the subject, and two felt negative emotions described as “nervous” and “scared.” Similarly, in ARTS 300 many expressed great excitement and interest from the onset. However, unique to ARTS 300 were many students’ verbalized negative emotions in the pre-semester surveys with “apprehensive,” “scared,” “nervous” and “intimidated.” Several noted that they lacked experience in the area or had not recently studied the subject at hand as contributing factors. Variations on “Art is not my forte” and “I am not a creative” were repeated by students pre-judging their abilities in regard to the study of art. Some in this course expressed feeling a mixture of emotions at the beginning of the semester, such as scared, but also interested and excited at the possibility of trying something new or beyond their scope of expertise. A handful of students in all of the courses admitted that they were not interested in the given subject or lamented that the subject was required at all.

At the conclusion of the study, many students indicated that they increased their understanding and felt more comfortable with these subjects. One participant in HUMN 101 wrote, “I feel grateful about being more knowledgeable about art,” and another noted, “I look at art differently and pay more attention to the work.” In HUMN 101, all reported positive feelings at the close of the study, with one also complaining that there was “too much to learn.” In ARTS 300, most expressed positive emotions on the post-semester surveys, and many also revealed that their level of intimidation had declined as their comfort level with the subject had increased. Some described a shift in their perception of the subject, with one student writing: “I feel that learning about art has given me a bit of a new perspective. I am looking at what I might have previously considered boring with a new view.” Some commented on the application of the course content to their life and profession: “I am very happy to have taken this class because it has actually revitalized my view of being a nurse . . . It feels good to take a new look at things around me with a more critical eye of why certain things work, or don’t, to the eye;” and “I see how health influenced art and how art can influence health.” At the close of the study, a handful of negative emotions were reported in ARTS 300. One student said that he/she was not comfortable with the subject, while another was not interested in the subject. Another complained of the necessity of too much required knowledge, and a few remained self-critical of their developing skills. In BIOL 150, all but one participant indicated positive emotional responses, such as “enjoyment,” “interest,” “fun” and thought-provoking. One student

explained, “I enjoyed how we were taught the relationship between biology and beer.” A few mentioned that the class had actually changed their perceptions of biology and their sense of mastery of knowledge, for the “better.” For example, one wrote, “I honestly hated biology prior to this course, but because of the interesting theme it made me want to learn about biology . . . I learned a lot.” Another noted, “I feel that I have a better understanding of the subject now.”

Initially, when asked to discuss their feelings about going to an art museum, most in HUMN 101 reported that, “yes,” they would enjoy it, with one reporting “maybe,” and one “no.” At the conclusion of the study, most reported “yes,” three reported “maybe,” and one reported “no.” Likewise, most in ARTS 300 said that, “yes,” they would enjoy going to an art museum, but a few also listed time constraints, a lack of passion, or concern about a lack of knowledge about art as obstacles in attending. A couple of students indicated that they would enjoy this only if the museum contained the type of artwork that they liked. About a third of those surveyed said that “maybe” they would enjoy art museums, and five said that, “no,” they would not like this trip. At the conclusion of the study, almost all said that, “yes,” they would like to go to an art museum, and some indicated that they felt they had new knowledge, greater appreciation, and enriched skills to apply in such a setting. Only two respondents answered with “maybe” and one with “no.” In contrast, pre-surveys in BIOL 150 indicated that three participants said that, “yes,” they would enjoy going to a professional biology conference, and most stated that “maybe” they would like this; with one student stating “no.” In BIOL 150 post-surveys one respondent said he/she would like to attend a professional science conference, and two reported “maybe.” Most students did not think that they would enjoy attending a professional science conference, with many citing a lack of passion as the explanation.

When asked on post-semester surveys if the theme influenced student learning about the study subjects of art or biology, an overwhelming majority of students responded “yes” in both ARTS 300 and BIOL 150 and provided insights into how the theme assisted them directly in their learning or helped improve their attitudes toward learning the subject. Students cited four interrelated types of benefits to having a theme. The most frequently cited benefit of themes was that they allowed students the ability to see the application or meaningful use of the subject they were studying. For example, ARTS 300 students wrote: “I found how art has a direct relationship to healthcare. I now see how artwork can help to decrease pain, help with relaxation, and help to form a calming and peaceful environment for the patient,” and “. . . my knowledge of my profession (nursing) was enhanced by this class.” A few noted that the theme of healthcare helped them form personal connections to the viewed artwork as underscored in this comment: “[The theme] allowed me to feel the passion within the art pieces. Seeing nurses from other eras allowed me to picture myself in their shoes, and to see through the eyes of a patient.” In BIOL 150, the theme allowed for students to appreciate the relevance of the new subject to their lives: “It helped explain/relate biology to everyday use.” This applicability prompted students to ponder the implications of drinking in BIOL 150, as exemplified by this comment: “. . .I know the risks of too much beer.”

Second, students reported that themes facilitated learning new subjects. One student explained how the theme of healthcare provided a feeling of familiarity that helped him/her to approach the new subject of art: “Certainly, as a nurse my passion is nursing. By incorporating something that was so familiar (nursing and healthcare) with something that was new and different (visual arts), helped me to learn.” Others echoed that connecting to an already known

theme provided a scaffold that improved learning of new material: “Placing the learning of a relatively new concept of art around a known concept of healthcare facilitated relevance which allowed for greater and more meaningful learning,” and “. . . I can relate art concepts to my established knowledge.” Similarly in BIOL 150, three students expressed that the theme helped transform the way they learned biology and created an active learning setting: “It was a more real-hands on experience!”

Third, many students felt that the theme helped maintain their motivation and interest in the study subject, which a few directly connected with their improved “focus” and “success” in the courses. For example, a student in ARTS 300 commented, “I think I would lose interest fast and probably not do as well unless the artwork was specific to my other interests.” In BIOL 150 a student wrote that the theme of beer “made me want to come to class.” Another BIOL 150 student noted that the theme “somewhat forced me to learn concepts I would otherwise ignore.”

Fourth, connecting to a known theme promoted positive attitudes such as comfort and enjoyment with learning new material. One student explained, “Any discussion or reference to healthcare was interesting and I felt comfortable with it. Healthcare is my comfort zone. Art was not, but I do feel more comfortable discussing it now than I did six weeks ago.” Others noted the pleasure the theme allowed for in the learning of new material: “Honestly, the way that art was integrated into healthcare history made learning pleasant. Okay, it made it fun . . .” Similarly, several students in BIOL 150 wrote about how they found the class enjoyable, “interesting,” and “fun.” One summarized this impact as follows: “. . . beer is something I enjoy, and including learning and science made it educational to enjoy.”

Only in HUMN 101 was the class divided with respect to the benefit of the theme. The benefits cited by students echoed those above with students saying that the theme of food helped them to learn, connected to his/her major, and could be applied to everyday life. However, a few students noted the following issues with the theme integration: “I did not really see many works that included food.” “It wasn’t that interesting to me.” “[I] couldn’t really put it together.” Thus, the professor’s own reflection and student qualitative data suggest that the theme of food was not successfully integrated into the HUMN 101 class. In ARTS 300, a few negative statements about theme-based learning included that the theme was confusing or hard to connect to all areas of the study subject or that the theme was restrictive. In ARTS 300 and BIOL 150 combined, four students also commented that the pace or workload was too intense.

Discussion

The quantitative and qualitative results combined yield insights into benefits of using theme-based approaches to teaching and learning that help address the gap of data noted in the literature (Handal and Bobis, 2004). One area in particular, the increase in perceived connection between subjects and themes, is a unique asset of theme-based learning. More beneficial significant results and positive shifts in qualitative responses were found in the two courses that had highly-integrated themes, a finding that underscores concerns in the literature about the need for a thoughtful adoption of themes (Lipson, et al., 1993).

Lipson, et al. (1993) advocate that theme-based teaching can increase positive emotions about learning. We have seen in this study a significant increase in positive emotions about the study subjects in all of the theme-based courses. This shift toward positive emotions was

mirrored in the qualitative data where initial descriptions of nervousness, lack of interest, and fear gave way to comfort, interest, and excitement. Handal & Bobis (2004) and Mangan (2014) describe theme-based learning as a potential vehicle for improving student success, and in this study, comparisons of pre- and post-semester surveys revealed a statistically significant increase in perceived knowledge level in all courses. In qualitative explanations, students initially revealed narrow ranges of thought and a lack of knowledge about the study subjects and negative judgments about their own abilities with the study subjects. However, at the end of the study, students described improved skills and increased understanding, and thoughts about the study subjects became more developed as they incorporated broader views and applications of concepts. Correlations were thus found between theme-based courses and the development of positive emotions, with increases in perceived knowledge. However, it could be argued that any course, regardless of application (or not) of a theme, could yield gains in these two areas.

All courses yielded a statistically significant gain in perceived connection(s) between the study subjects and the themes, and qualitative responses indicated that the use of a theme helped students learn about the subject via the ability to apply subjects to the theme and their lives/careers, by increasing motivation/interest/comfort and by promoting learning by adding new knowledge to existing theme-established scaffolding. (These results align with benefits of theme-based learning described by Handal and Bobis, 2004, and Lipson et al., 1993.) These areas of quantitative and qualitative results illustrate the *unique* advantage theme-based learning may present over traditional, single-subject approaches. That is, thematic approaches support higher-level critical thinking skills as noted by Lung (1999), because they facilitate students in forming connections between areas of study (ex. between beer and biology) or between areas of study and their lives.

While there were similarities found across all three courses, statistically noteworthy differences also emerged in the study. Although, in all three courses, the theme was found to be statistically well-integrated into the class, qualitative responses about how the theme influenced learning in the subject were weaker in HUMN 101 where the theme had been lightly integrated. This weaker integration may account for some of the differences found in the data set with HUMN 101 often being the outlier. With respect to perceptions of increased use of the subject in one's career, results were statistically higher in post-semester surveys in ARTS 300 and BIOL 150, but not in HUMN 101. The lower level of theme-integration in HUMN 101 is most likely responsible for this observed difference. Another explanation for this difference could be that HUMN 101 was unique in having a more wide-ranging mix of majors, whereas 27% of BIOL 150 post-respondents were hospitality/tourism/culinary majors who were potentially interested in beer as it relates to their careers, and ARTS 300 was composed exclusively of nursing majors interested in healthcare. Second, the lack of thematic integration in HUMN 101 may have contributed to the perception that only five of the seven objectives had been mastered. However, the fact that HUMN 101 had more objectives than the other two classes may have also been a contributing factor. Last, an increase in positive feelings about the study subjects was noted only in ARTS 300 and BIOL 150. It is noted that the lack of thematic integration may have impacted this trend and that the pre-semester survey scores were already higher in HUMN 101 with respect to passion for the subject than in the other two courses. This body of results suggests that scholars desiring to apply a thematic approach should strive for a high degree of thematic integration as advocated for by Lipson, et al. (1993).

Limitations in the research design may have also impacted the noted results. First, a comparative design was not used, so a non-themed control class was not sampled. Thus, generalizations about quantitative gains in comfort and knowledge gained pre- and post-semester may, or may not, have been due solely to the theme-based approach. However, the significant increases in these areas combined with qualitative statements from students about their perceptions of the benefits of the themes on their learning reveal the positive impacts of the theme-based approach. As quoted in the results section, students recognized that themes enabled their learning, created a sense of joy, and gave relevance to their learning. Further research using a comparative design between theme-based and traditional approaches is warranted to decipher gains exclusive to the thematic-approach. Second, only ARTS 300 was composed of a homogenous group of nursing healthcare professionals, and they had already completed their RN degrees. This was the only course for which a statistical increase in the feeling for the theme (healthcare) was found. Conversely, in BIOL 150, a handful of culinary arts/hospitality majors may have found professional connections to the theme of beer, and in HUMN 101 only one student was from hospitality with the potential of a professional interest in the theme of food. The mixed composition of majors in these two classes could thus explain why student feelings for the theme were not improved by taking the course. Thus, it is an intriguing possibility that professionally-based themes could be used to enhance feelings about the profession while simultaneously allowing the exploration of a new and related study subject. Third, only in ARTS 300 was there a significant increase in predicted enjoyment in going to an art museum. There was no significant increase in the desire to go to a professional science conference. In retrospect, an art museum is a more common venue for the general public than a professional conference, and this difference may have affected the students' responses. Finally, consistent with the literature, the online ARTS 300 course had the lowest post-survey response rate (Sax, Glimartin & Bryant, 2003). Perhaps this is not surprising, given that dedicated class time was allotted for completing the survey in the two face-to-face classes. It is possible that this skewed the ARTS 300 post-survey results to the extremes of both favorable and unfavorable.

Finally, it is important to point out the two areas that did not yield statistically significant results in any fields. First, no statistical difference was found in students' perceptions of the relationship between the theme to their career in pre- and post-semester survey comparisons. This makes perfect sense as few students were changing their career paths during the duration of the study. Second, no statistically significant changes were reported in any of the courses with respect to personal connections to the study subjects, and, again, this lack of change is understandable as the students' life histories were also not likely to change dramatically over the duration of the study.

Conclusion

The statistical feedback from students in all of the courses overwhelming indicated that having a theme was helpful in their development. Students mentioned increases in motivation and enjoyment in the qualitative responses. They felt more comfortable connecting new knowledge to something that they had already liked or understood. A few expressed that they could apply the subject in their lives, in turn affecting the depth of their thoughts and their degree of caring about the subject. The researchers thus encourage others to apply meaningful themes to their courses and to research the effectiveness of this teaching and learning strategy.

From the quantitative and qualitative data collected in this study, it appears that using a theme-based approach to teaching and learning has several merits in science and art classes, including gains in positive emotions about study subjects and increases in perceived growth of knowledge. These gains could plausibly be found in non-theme based courses over the duration of a semester, but the less significant results found for HUMN 101 compared to the other courses show the importance of using a well-integrated theme to promote students' comfort and learning. The statistically significant growth found in perceived connections between the study subjects and theme, and in qualitative responses about the positive influence of the theme on learning about the subject, reveal the *unique* potential that theme-based learning offers to enhancing educational pedagogy and strengthening students' abilities to apply what they are learning to their lives/careers. In particular, in courses geared to a specific major, a major-based theme may promote feelings about the major while simultaneously allowing the introduction of new study subjects. Clearly, qualitative results suggest that a theme cannot be lightly applied; rather the theme must be fully integrated and applied across an entire course in a meaningful way. Additional research into carefully integrating themes into course content and the relationship between the degree of thematic integration and its impact on student perceptions and successes would be beneficial. Furthermore, comparative studies between thematic- and traditional-approaches to teaching are desired for discovering which, if any, of the noted benefits are attainable only with thematic-approaches. Finally, the surprisingly numerous negative emotions expressed about study subjects at the onset of the study is worthy of further study, as, perhaps there are other methods of mitigating these negative emotions in addition to theme-based approaches.

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Appendix 1. Sample Pre-Semester Survey for HUMN 101 (*ARTS 300 substitutions, **BIOL 150 substitutions)

As part of a research project about theme-based learning, please take a few minutes to respond to the following questions about your comfort and knowledge with the visual arts (**or biology). Specific questions we are studying include if: 1-the use of a theme (in this case food, *healthcare, or **beer) in a class will facilitate learning a "new" or unfamiliar subject (like Art, **or biology) and if 2- the use of a theme will promote familiarity and comfort with a new subject. Your participation is voluntary and will not affect your grade; you have the right to withdraw from the study at any time. You will not receive any benefits or compensation from participating in this study. Each survey should take between five and ten minutes to complete.

You must be at least 18 years old to complete this survey. If you would like the survey read to you, please let the researcher know. Thank you in advance for your help!

1. Please indicate your major _____
2. When you read the word “art” (**or “biology”) what do you think of?

3. At the beginning of this semester, how do you feel about learning about art (**or biology) ?

4. Have you studied visual art (as opposed to music, dance, etc.) (* *or biology) at the college level?
 Yes
 No
5. Have you studied visual art (** or biology) at the high school level?
 Yes
 No
6. How do you feel about the theme of food (*healthcare, or **beer)?
 Passionate
 Somewhat interested
 Not interested at all
7. Does the theme of food (*healthcare, or **beer) relate to your chosen career-choice?
 Yes
 Somewhat
 No
8. Do the visual arts connect to the theme of food? (*Does art connect to healthcare? **Does biology connect to beer)?
 Yes,
 Somewhat
 No
9. Could you use the visual arts (**biology) in your chosen career?

- Yes,
- Somewhat
- No

10. How do you feel about the visual arts (**biology)?

- Passionate
- Somewhat interested
- Not interested at all

11. Do you have a personal connection to the visual arts (**biology)?

- Yes,
- Somewhat
- No

If yes, please explain

12. How comfortable are you with discussing visual art (**biology)?

- Very comfortable
- Somewhat comfortable
- Not comfortable at all

*13. Do you think you would enjoy going to an art museum (**going to professional biology conference)?

- Yes
- Maybe
- No

Please explain your answer

14. Do you like the visual arts (**biology)?

- Yes
- Maybe
- No

15. How would you describe your overall knowledge level of the visual arts (**biology)?

- Very knowledgeable
- Somewhat knowledgeable
- Not skilled or knowledgeable at all yet

16. How would you describe your overall knowledge level of food (*healthcare, **beer)?

- Very knowledgeable

- Somewhat knowledgeable
- Not skilled or knowledgeable at all yet

*17. Please indicate if you CURRENTLY feel knowledgeable of or capable of completing each of the following objectives: (**5-7 course specific objectives were listed, and students were asked to check one of the following choices for each objective.

- Very knowledgeable; I can do this
- Somewhat knowledgeable; I can do some of this
- Not skilled or knowledgeable at all; I cannot do this yet

Thank you! This completes this survey.

Appendix 2. Sample Post-Semester Survey for HUMN 101 (*ARTS 300 substitutions, **BIOL 150 substitutions)

Post-Semester Surveys were identical to Pre-Semester Surveys (see above) except the following two questions that contained revised wording, and the last two questions which were added:

2. When you read the word “art,” (**biology) what do you think of? How does your response relate to your thoughts at the beginning of this semester?

3. At the end of this semester, how do you now feel about learning about art (**biology)?

18. Was the theme of food (*healthcare, **beer) well-integrated into the class?

- Yes
- Somewhat
- No

19. Do you feel the food (*healthcare, **beer) theme influenced your learning about art? Please explain your answer.
