Use of Enabling Technology to Enhance Self-Efficacy Beliefs and Social Capital Dispositions: Integrating ArcGIS in an Upper Level Business Course

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Abstract: We present, via this paper, the results of a study that examined whether classroom-based group work in conjunction with use of ArcGIS, as an enabling technology, helps strengthen students' domain knowledge and career-related skills. The study focused on the use of learner centered pedagogy with technology as part of a semester long classroom project in an upper division business administration course. Activities for the project occurred both within and without the classroom. Participants had to use the ArcGIS software to perform data analysis and make recommendation about an important real-world business decision. Preliminary results from the study indicate that the use of learner-centered pedagogy along with technology and classroom-based group work can help foster self-efficacy and social capital development allowing students to gain the hard and soft skills needed for their future careers.

Introduction

With the emergence of a multicultural, globally intertwined, and knowledge-centered economy, higher education institutions all over the world are seeking ways in which to ensure that their graduates possess the requisite skills and competencies demanded by all types of employers (Bartel-Radic, Moos & Long 2015; Bialik & Fadel, 2015; Gray & Koncz, 2017). At the same time faculty members are challenged with regards to creating learning experiences within or without the classroom that are engaging, motivating, and meaningful (Arum & Roksa, 2011; Halpern, 1999; Henderson, Selwyn and Aston, 2015; Miri, David & Uri, 2007). Recently, however, there has been increasing focus on how to best use learner-centered pedagogy to help strengthen student's self-efficacy beliefs and social capital dispositions, as these two constructs have been shown to help with achieving the hard and soft skills needed to solve complex real-world business, social, and civic problems (Cherry, 2017; Fabris, 2015; Kivunja, 2015; Shirey, 2012).

Self-efficacy, as defined by Bandura (1978), is a construct that relates one's self-judgment or self-reflection to the ability of performing a task in a specific domain. Putnam (2000), and Lin (1999) on the other hand offer that social capital is an important conduit through human networks for knowledge sharing, idea exchange, and maintaining currency on important topics. Thus, a focus on increasing the self-efficacy and social capital of an individual stands to lead to the achievement of his/her personal, professional, and life goals.

There are several pedagogically-grounded instructional models, methods, and frameworks available to help students acquire both hard and soft skills (Chickering & Gamson, 1991; Grasha, 1996; Koedinger, Corbett & Perfetti 2012; Kuhn, 2000). Yet, successful instructional approaches to teaching those skills often make use of learner-centered pedagogical principles and techniques (Case, 2005; Dole, Bloom & Kowalske, 2016; Lattimer, 2015;

Moate & Cox, 2015). Nevertheless, a key challenge involves the need to incorporate metacognitive awareness, or a self-questioning, component as part of the learner-centered instruction. Such an approach is *sine qua non* to realizing the higher order thinking needed for achieving desired learning gains and educational outcomes (Schraw, 1998; Schraw and Dennison, 1994).

Students who have obtained the soft and hard skills such as critical thinking and problem-solving competence may not be in position to apply them correctly or may lack the confidence or self-efficacy to use them properly (Gick & Holyoak, 1980; Tsu, 2002). Bialik & Fadel (2015) and Glaser (1984), offer that instructional activities and assignments need to be embedded across a curriculum or most specifically in major-oriented courses (i.e., the upper division curriculum or a concentration) to help students develop critical thinking and problem-solving skills, which often involves working in groups. As a result, efforts to strengthen the social capital of students may help facilitate the acquisition of higher order skills. Moreover, students need to receive repeated instructions, engage in deliberate practice, and exert sustained effort, often, with the help of enabling technology to gain higher order skills and competencies (Fishman, 2013; Grasha, 1996; Miri, David, & Uri, 2007).

Research also shows that students' motivation, attitudes, and dispositions affect the way they employ skills that they have acquired (Halpern, 1999; Sears & Parsons, 1991). Thus, the use of appropriate pedagogy must be carefully considered when designing and deploying instructional approaches to influence students' intellectual, career, and personal skills for life-long growth and development.

Via this paper, we argue that the use of learner-centered pedagogy along with an enabling technology, such as a geographic information system (GIS), in a classroom, can help strengthen students' self-efficacy beliefs and social capital dispositions. We also delineate and discuss the results of our study, which examined whether a focus on increasing students' self-efficacy beliefs and social capital dispositions will allow them to gain the hard and soft skills needed for their future careers.

Knowledge Acquisition and Personal Growth

By many accounts, the 21st century job market is proving to be less structured and more free-flowing than anticipated (Fabris, 2015; Gray & Koncz, 2017). Moreover, as a result of increased use of technology tools and applications in the workforce it is anticipated that workers will tend to experience greater autonomy and collaborate more in completing their job than they did in the past (Jessop, 2010; Wang, 2002.) Therefore, to effectively prepare students to enter this world means equipping them with strong technical and interpersonal skills.

Recent studies have shown that self-regulation skills, especially the kind of effort that are encapsulated in self-efficacy beliefs, are necessary for an individual to have greater autonomy or self-reliance in completing work-related tasks (Cherry, 2017; Zajacova, Lynch & Espenshade, 2005). Further, greater collaboration means that success depends on effective communication and information exchange. Individuals with more social connections (greater social capital) will be better positioned to acquire necessary knowledge and skills (Lin, 1999; Yodo and Yano, 2017).

Perspectives on Self-Efficacy

According to Bandura (1997), self-efficacy is a powerful predictor of effort and behavior. Whereas domain knowledge and skills affect how well someone will complete a task, their self-efficacy impacts whether they will even attempt it in the first place. Self-efficacy then refers to the perception of one's capability to act in ways that will meaningfully affect future situations (Bandura, 1997). Self-efficacy is also different than outcome expectations, which refer to beliefs about the likelihood of a specific result. Self-efficacy on the other hand is the belief that one can affect the outcome, not that a specific result will occur. Critically, outcome expectations occur after a behavior but self-efficacy precedes and motivates behavior. Self-efficacy is also related to perseverance and behavior change (Bandura, 1997). In college students, self-efficacy is more predictive of academic achievement than stress (Zajacova, Lynch, & Espenshade, 2005).

Numerous studies have found that self-efficacy is critical for learning and academic success in college students (Pajares, 1996; Zimmerman, 2000). Self-efficacy beliefs exert a strong influence on the choice of academic majors by college students pursue, affect the goals they set, and impact their study behaviors and academic achievement (Pokay & Blumenfeld, 1990; Zimmerman, Bandura, & Martinez-Pons, 1992). As noted by Pintrich & DeGroot (1990), self-efficacy belief ultimately affect the learning behaviors and academic persistence of students indirectly through effort (Pintrich & DeGroot, 1990).

Self-efficacy beliefs have the strongest relationship with behavior when they occur in the same domain. For students, this means that "academic self-efficacy" is better than "general self-efficacy". Thus, when predicting study behaviors, "math self-efficacy" is better than "academic self-efficacy". According to Bandura (2006), self-efficacy can generalize or transfer to other domains in several ways. Transfer occurs when similar skills or sub-skills are required or when activities share higher-order self-regulation skills, including those used by students to stay focused and engaged in different academic disciplines. From a pedagogical perspective, co-development of skills – when skills in different domains are developed concurrently – can also increase the transfer of self-efficacy beliefs.

Developing skills together has the benefit of linking self-efficacy beliefs as well. Finally, enabling student success, especially with difficult tasks, provide "powerful mastery experiences that provide striking testimony to one's capacity to effect personal changes can produce a transformational restructuring of efficacy beliefs that is manifested across diverse realms of functioning" (Bandura, 2006, p. 308).

Perspectives on Social Capital

The Organization for Economic Co-operation and Development (OECD) defines social capital as "networks together with shared norms, values and understandings that facilitate co-operation within or among groups" (Cote and Healy, 2001:41). As such, social capital provides a means, through a network or multiple connected networks of people to learn or exchange new skills, knowledge, perceptions, and even attitudes about real world items or phenomena (Bloom & River Path Associates, 2000; Coleman, 1988; Diop, Pascot and Mbibi, 2013). Thus, someone with more social capital (i.e., the person is connected to a larger network of people) is better off than a person who has less social capital (Field, 2005; Granovetter, 1973; Greenhow & Burton, 2011; Putnam, 2000.)

In his seminal work on the power of civic engagement and group association, Putnam (2000) offers that social capital allows people who are otherwise strangers to experience reciprocity (or to exchange knowledge, provide support to each other, and trust each other) in the pursuit of shared objectives (pp. 18 – 21). Likewise, Field (2005), discusses that the increased in social capital has the potential to be a heuristic device, which helps with the development and acquisition of skills that are relevant in the real-world. Further, in a recent study, Yodo and Yano (2017) found that higher education is likely to facilitate the formation of social capital, and, indirectly, lead to greater income. Other researchers have also indicated that social capital formed during college or tightly-knit human networks can lead to enhanced civic engagement, trust, cooperation, and equality (Cook & Cooper, 2003; Keeley, 2007; Cozzolino, 2011).

Learner-centered Pedagogy

A key aspect of our study involves the incorporation of a blended pedagogical approach, which supports the idea of integrating an enabling technology in the classroom for knowledge acquisition and professional skills building (Arum & Roksa, 2011; Fink, 2003; Sweet, Blythe, Phillips, & Carpenter, 2016). Below are two learner-centered pedagogical approaches that are at the core of the study.

Action Learning

With roots in the business world, Action learning (AL) delineates a clear strategy for training managers on the job (Revans, 2011). At its core, AL facilitates learning while doing and involves working in group settings to solve real-world problem using a "learning vehicle." Further, in AL the work is to be performed under the supervision of an advisor that can guide the group as needed (Weinstein, 1999). As a pedagogical approach, AL requires each "learning vehicle" to be situated in a workplace (or simulated workplace) environment and to have clear and measurable goals. Problems and issues being addressed through AL should be open-ended with no clear answers (McGill & Beaty, 2001). As a result, participants in an AL related-activity are encouraged to share insights and ideas with one another as they explore the problem. This is because solving the problem requires collaborative application of knowledge and skills that the group possesses as a whole (Marquardt, 2011).

Reflection is another key component of AL. As presented by Marquardt and Yeo (2012), when AL is being used, participants are encouraged by the advisor to reflect on what they have learned, the task, and themselves. As the advisors main role is in AL to scaffold the learning process, they must focus on monitoring and assisting participants in AL activities as needed (Gibbons, Boling & Smith, 2014; Joesbury, 2015). The AL advisor also helps maintain focus on the problem and can intervene to facilitate greater interaction by the members of the group. The AL advisor may also model or draw attention to specific behaviors or opportunities to help move the process forward (Leonard & Marquardt, 2010; Revans, 2011).

Results achieved through AL cannot be prepackaged solutions (O'Neil & Marsick, 2007; Shirey, 2012). Given that, the use of AL capitalizes on intrinsic motivation on the part of the students. Further, since the problems examined via AL require learning something new or different application of existing skillsets, participants must employ critical thinking skills such as problem deconstruction, planning, critical evaluation, and reasoning to arrive at viable solutions (Marquardt, 2011; Shirey, 2012).

Team Based Learning

Team-Based Learning (TBL) places emphasis on having students work as part of a group to accomplish an educational goal or learning objective (Michaelsen, Sweet & Parmalee, 2009). With TBL, students are placed in groups of three to five peers to work together for a significant period of time to resolve a real-world issue or problem (Hill, 1982; Kamei, Cook, Puthucheary & Starmer, 2012; Lassk & Mulki, 2018). Such an instructional set-up is critical to learning and collective performance improvement because it requires students to engage in sustained discussions and dialogues, and thus obtain greater insights about the team's strengths and weakness (Baldwin, Bedell & Johnson, 1997; Hodges, 2018; Matveev & Milter, 2004; Schaffer, Lei & Reyes, 2008).

According to Krathwohl (2002) and Fairfield and London (2003), the use TBL is most effective when members bring different perspectives and skill sets to the issue or problem being analyzed, as the solution to real-world problems often require use of both conceptual and procedural knowledge. Moreover, diverse teams allow the development of deep learning, growth in critical analysis and self-reflection skills, and greater appreciation for alternative viewpoints and perspectives (Birmingham & Michaelsen, 1999; Buckingham & Deakin, 2012; Fink, 2003). Hence, students involved in TBL activities must at times defend their positions and accept the viewpoints and conclusions presented by their peers when trying to arrive at the most viable solution to the problem that they are asked to resolve (Baldwin, Bedell & Johnson, 1997; Hernandez, 2002; Pelley & McMahon 2008).

Jonassen and Lee (2006), offer: "*According to newer perspectives, learning is less a solitary act of individuals but rather is distributed among people, their tools, and communication media, history, and the artifacts they create. Knowledge exists not only in the heads of learners, but also in the conversations and social relations among collaborators*" (p. 144).

ArcGIS as an Enabling Technology for Self-Efficacy and Social Capital Development

The phrase enabling technology is currently used to signify major innovations in a culture, such as computer tools and applications, which are used to increase performance and capabilities of the user, system or processes. (Cascio & Montealegre, 2016; Čolaković & Hadzialic, 2018; Diziol, Walker, Rummel & Koedinger, 2010; Nealy, 2018). As presented by Pouri and Hilty (2018), information and computing technology (ICT) platforms enable big-data-driven application systems e.g., a Geographic Information System (GIS), to present and trace information on goods, services, consumers for the purpose of improved decision making.

A GIS is a type of application that allows users to capture, store, analyze, manipulate, and manage geospatial data such as the location, elevation, depth, area and length of physical structures (Folger, 2011). Pick (2008), notes that GIS applications are now widely used in the sciences, education, business, and government. A key feature of GIS applications is that they allow the combination of geospatial data, census data, analytical models, analysis tools to support managerial decision making (Laudon & Laudon, 2010). As a result, GIS tools and applications have been categorized in many research and studies as special types of enabling technology (Reed & Bodzin 2016; Wheeler, Gordon-Brown, Peterson, & Ward 2010).

ArcGIS, the technology that we use in the study, is an application that was created by a company called ESRI (Environmental Systems Research Institute). ArcGIS makes it easy for people without a geography background to use GIS software to solve important business problems (Krivoruchko, 2011). ArcGIS is currently widely used in the workplace to support decision making (Singleton, 2012). Consequently, ArcGIS as used in the study serves as an enabling technology for meeting current and future business needs in the real world. Moreover, we followed a pedagogical approach based on the principles and tenets of AL and TBL to ensure repeated practice and that the learning experience involved a practical application context (Kirkwood & Price, 2014; Olofsson & Lindberg, 2014).

In addition, we followed a blended pedagogical approach for the study to help students strengthen domain knowledge, decision-making, and collaborative working skills needed to be successful in their future careers or other post-collegiate endeavors (Congleton & Rajaram, 2011; Winarno, Muthu, & Ling, 2017). Further, since most students taking the class were not familiar with the ArcGIS and the pedagogical approach used in the study,

instructional scaffolding was used to bring students up to a level where they could use the tool effectively and engage in the level of higher order thinking needed to solve their assigned problem (Joesbury, 2015).

Methodology

Context

Our study, which is called *Use of Enabling Technology to Enhance Self-Efficacy Beliefs and Social Capital Dispositions,* was conducted at a master's comprehensive public university in the southeastern region of the US. We selected a class that required students to learn ArcGIS in it and then use the application in groups to make recommendations about a real-world business decision. Furthermore, the class was an upper division Business Administration, which had the focus on strengthening student's problem-solving, critical thinking, and collaborative decision-making skills. The study was then conducted over a period of two consecutive semesters.

Below are the course's student learning outcomes, which were most in sync with the study:

- To develop an understanding of marketing and management processes
- To provide students an understanding of the professional career opportunities available in their chosen professions
- To teach students how to use technology to develop effective written and oral communications with the intention of gaining acceptance of their ideas by others

ArcGIS application was a particularly good enabling technology tool to use for the study. For instance, ArcGIS can be used in industries such as retail, logistics, architecture, marketing, agriculture, biotech, forestry, and energy for the purpose of mapping and locating building, equipment, and tools (Heywood, Cornelius, & Carver, 1998). Moreover, as presented by Johnston (2013) ArcGIS is used in a wide range of activities such as business planning, risk management, demographics analysis, demand forecasting, housing master planning and growth management. Consequently, the learning goals, activities, and outcome requirements for the course that we selected were relevant for the ArcGIS 4 SE and SC Development study.

Research Questions

The purpose of the study was to ascertain the degree to which use of ArcGIS in a course affects students' self-efficacy beliefs and social capital considerations as they prepare for their post-collegiate lives. We used a quasi-experimental research design with a non-equivalent control group and pre-post design for the study.

The two questions investigated by the study were as follows:

1. Does sustained use of the ArcGIS tool impact learners' self-efficacy beliefs and attitudes about their career readiness for the future?

2. To what extent does use of an enabling technology like ArcGIS along with group work in the classroom influences students' social capital considerations and opportunities for their professional lives?

Participants Selection

Participants for the study were students who took an upper division business administration class in fall 2016 and spring 2017 semesters at the university. The fall class had 28 students and the spring class had 30 students leading to a total of 58 participants in the study. The participants were personally invited to participate in the study by the instructor of the class.

Instruments

We use a survey instrument that measured self-efficacy, social capital, and demographics questions for the study. Participants were asked to rate their self-efficacy using questions based on the approaches and models offered by Rowbotham and Schmitz (2013) and Gaumer, Erickson, and Noonan (2018). The Likert questions used a scale range from 1 (*Strongly Agree*) to 5 (*Strongly Disagree*). Three social capital sub-areas were assessed using open-ended questions, which are communications and decision-making in groups, collaboration and teamwork, and career and professional networking.

Data Collection

Data used for the study came from the answers provided by the participants. Participants were asked to complete the survey at the beginning and at the end of the course, after the students had the opportunity to use the ArcGIS tool for the team-based course assignment. To measure link between the use of ArcGIS and the two phenomena being evaluated through the study, Self-Efficacy and Social Capital we utilized the data collected via the Likert-scale and open-ended questions of the survey.

Data Analysis

MS-Excel was used to perform general data analysis for the study. Statistical analysis was performed using Minitab© statistical software. MS-Word was used to document, process and analyze all qualitative data. The open-ended answers provided by the participants were manually analyzed and coded into three social capital-related skills and competencies, which were pertinent to the study.

Results and Discussion

This section of the paper presents descriptive statistics of the study. These are followed by inferential statistics obtained from results of tests conducted with the data collected for the study. Table 1 presents means and standard deviations for the key variables and the phenomena being analyzed for the study.

(N=58)	Mean or % (N)
Gender	
Male	48% (28)
Female	52% (30)
Class Status	
Senior	81% (47)
Junior	19% (11)
Employed	50% (29)
Transfer Student	17% (10)
Major	
Marketing	41% (24)
Management	24% (14)
Communications	19% (11)
Healthcare	9% (5)
Finance	7% (4)
L. E. C. T.[1]	2.79 – 1.26 Std. Dev

Level of experience with computing technology; Scale used 1 – 5 with 1 = Beginner and 5: Highly Proficient.

Table 1: Participants' Demographics

Q1: Analysis of Self-Efficacy

The first question of the study examines the way in which use of the ArcGIS tool impact learners' self-efficacy beliefs and attitudes about their career readiness for the future. To answer that question, we conducted a series of paired t-tests to identify changes in the levels of confidence expressed by participants for each of the self-efficacy items used in the questionnaire. The Overall measure was developed for each participant as the average score of all the items related to self-efficacy in the questionnaire. In addition, we broke those items into the three acknowledged self-efficacy domains, which are *Magnitude, Strength, and Generality* (Hornik, DeNoyelle & Johnson, 2014; Van der Bijl & Shortridge-Baggett, 2001). All tests were conducted at $\alpha = .05$ level of significance.

As shown in Table 2, participants rate themselves as having stronger confidence (i.e., lower mean post-test values than the figures for the pre-test) in themselves for each of the self-efficacy item that was evaluated as part of the ArcGIS study. Each item as noted previously is broken down and linked to a specific self-efficacy domain.

Self-Efficacy Scale (N=58)	*Mean (Pre)*	*Mean (Post)*	*Diff. (Pr-Po)*	*Diff Std. Dev*

(Cronbach's alpha = 0.7686)[***]				
Domain: Magnitude				
I am confident about communicating my ideas to others.	2.17	1.62	0.55	1.11
I am confident about my Information Technology skills.	1.98	1.79	0.19	1.29
I can manage timelines and projects more effectively.	1.95	1.69	0.26	1.04
Domain: Strength				
I can cope with unstructured problems.	1.98	1.97	0.02	1.47
I am more proficient in working with data and numbers.	2.26	2.00	0.26	1.42
Domain: Generality				
I feel better prepared to handle unknown and unseen school or work-related issues.	2.21	1.84	0.36	1.25
I am able to overcome barriers that stand in the way of my goals.	2.19	1.79	0.40	1.35
I am more proficient in working with GIS and similar applications.	2.62	2.02	0.60	1.43

*** Scale used range from 1 = Strongly Agree to 5: Strongly Disagree

Table 2: Self-Efficacy Score - Before and After ArcGIS use

Paired t-tests were used to gauge the change in the self-efficacy measures for each of the participant in the study. As shown in Table 3, the results revealed significance regarding change in self-efficacy as a result of the participants' use of the ArcGIS tool for the three domains and the Overall measure.

	Before ArcGIS Use			*After ArcGIS Use*			*t*	
	Learner Overall SE Test n = 58							*p*
Self-Efficacy Domain	*Mean*	*Std. Dev.*	*SE Mean*	*Mean*	*Std. Dev.*	*SE Mean*		
Magnitude	2.035	0.639	0.084	1.701	0.521	0.068	3.01	0.002
Strength	2.198	0.858	0.113	1.819	0.673	0.088	2.77	0.004
Generality	2.287	0.763	0.100	1.994	0.546	0.072	2.24	0.015
Overall	2.17	.652	.0857	1.84	.523	.068	2.75	0.004

*** Scale used range from 1 = Strongly Agree to 5: Strongly Disagree

Table 3: Individual Self-Efficacy - Before and After ArcGIS use

Finally, we decided to look at whether the use of the ArcGIS tool were perceived by participants as helpful to strengthening their self-efficacy. To conduct that analysis, the difference between before and after answers provided by participants were categorized as "Enhancing" (non-negative difference) and *"Non-Enhancing"* (negative difference). As shown in Figure 1, at least 67% of participants noted that the use of the ArcGIS tool led for all three self-efficacy domains. Further, that same analysis shows that 86% of the participants in the study thought that the use of ArcGIS led to the enhancement of their overall self-efficacy beliefs.

Figure 1: Self-Efficacy Changes Due to ArcGIS Use

Q2: Analysis of Social Capital

We used the open-ended section of the survey to answer the second question of the study, which sought to find out the extent to which use of an enabling technology like ArcGIS along with group work in the classroom influences students' social capital considerations and opportunities for their professional lives. Further, the answers provided by the participants for the three skill sets or competencies related to social capital were marked as either *Enhancing* or *Non-Enhancing* similar to the approach that was used for the change in self-efficacy test.

As illustrated in Table 4 below, communications & decision-making in groups, collaboration & teamwork, and career & professional networking received scores of 92%, 82%, and 92% respectively for *Enhancing* and 8%, 18%, and 2%, respectively for *Non-Enhancing.*

	Responses		
Skill Dimension	**N**	**Enhancing**	**Non-Enhancing**

Communications & Decision-Making in Groups	50	92%	8%
Collaboration & Teamwork	48	82%	18%
Career & Professional Networking	57	98%	2%

Table 4: Social Capital Score

Sample Comments

Communications & Decision-Making in groups

"Learning a new advanced technology, was very beneficial. The technology allowed us to see firsthand where post traditional students were coming from." (Participant #1).

"Me and my team member worked really well together. We quickly learned our team dynamic and stuck to it throughout the project." (Participant #8).

"I was really impressed by this software! That's so cool and the possibilities offered by this tool for CRM is amazing!" (Participant #10).

"The most significant experience was learning how to track business by location." (Participant #19).

"The most significant learning experience with this project was learning the Business Analyst software. I was not aware that [University] had access to such a vast amount of data or to what extent that it could be used." (Participant #37).

Collaboration & Teamwork

"We worked by ourselves on assigned graphs. After we finished we came together to combine them. To me that was the best both worlds." (Participant #12).

"I really enjoyed working with my team. We had a really fun and engaging atmosphere through the project." (Participant #14).

"My team struggled. Since we dint get to pick group we got put in bad groups of people who didn't do as much as I would have liked." (Participant #32).

"The GIS project was a great project because it allowed me to work in a smaller group, which meant schedules were easier to work around. I had a great team member who cared about the project as much as I did. We both had different strengths and weaknesses so where one of us were weaker, the other could take up the slack in that area. We both learned a great deal about Business Analyst and how to read and interpret the information that we found." (Participant #37).

"Working in group setting was great. I really enjoyed the sharing aspects of it. I believe our group will continue to connect beyond the classroom." (Participant #57).

Career & Professional Networking

"I learned a lot about how to use ArcGIS software. Now I understand how marketers use data to select their target market and how certain companies use tapestries to market their products. I plan to use what I learned in the class in the future." (Participant #7).

"I enjoyed learning about the ArcGIS system itself and its capabilities. Good for future resumes and probably potential jobs." (Participant #13).

"Learning about how different area/regions can have an impact on education and business. Also it made me aware about where to be successful at in regards to jobs and opportunities." (Participant #23).

"Using my knowledge of excel to apply to real world applications; learning how to use the GIS system". (Participant #35)

"I actually learned about different potential job opportunities in the 8 county area surrounding [University]." (Participant #48)

Given the results obtained from the participants' answers to the survey questionnaire, we can conclude that the use of an enabling technology along with group work in the classroom shows positive impacts to students' self-efficacy beliefs, and social capital considerations and opportunities. Moreover, given that the career & professional networking competency was the highest enhancing score received (98%) we believe therefore that the combination of a learner-focused instructional approaches such as TBL and AL along with the use of enabling technology

supports the orientation of helping graduating students strengthen their social capital and acquire important skills that they believe will be useful for their professional lives.

Limitations and Follow-on Work

Our study was undertaken as a pilot investigation to gauge preliminary indication on impacts of use of enabling technology and group work in the classroom on students' self-efficacy beliefs and social capital considerations. Given the narrow focus of the study, the results obtained thus far are not yet generalizable. We thus plan to carry additional investigations to determine the impact of sustained use of ArcGIS on specific professional skills and career-readiness items. Moreover, we will seek to find out the degree to which a specific mix of pedagogy (e.g., constructivism), instructional approach (problem-based learning), and enabling technology facilitates acquisition of key 21st century skills.

Conclusion

When taking on the challenges of integrating enabling technology tools or applications in a course, it is important to consider implementing the instructional activities and elements needed to create an effective learning environment for students (Race, 2014; Starr, 2011; Wang, 2002). Many of those items can be derived from established teaching and learning methods and practices such as those advocated by Chickering and Gamson (1991), Grasha (1996), and Koedinger, Corbett, and Perfetti (2012). As presented via this paper, the implementation of classroom-based group activities or assignments that are grounded in learner-centered pedagogy supports knowledge development and skills acquisition, while facilitating collaborative decision-making by students. (Bloom & Kowalske, 2016; Keengwe, Onchwari & Wachira, 2008). We specifically noted that the use of AL and TBL in the classroom in conjunction with enabling technology will tend to support the strengthening of self-efficacy beliefs and social capital considerations, which help students develop and cultivate skills such as critical thinking, problem solving, collaboration that are relevant to the 21st century workplace (Cherry, 2017; Keeley, 2007). Thus, we contend that the active engagement and interaction by students in classroom-based group work along with an enabling technology like ArcGIS can serve to strengthen both self-efficacy and social capital.

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