Teaching and Educational Methods

Teaching Information Literacy: A Case Study of the Ripple Effect in Teamwork

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Abstract

The purpose of this study is twofold: (a) describe a teaching case study with college students at a large U.S. university, and (b) highlight how the ripple effect enhances students' level of information literacy. An "information-literate" student recognizes the need for information and is able to locate, evaluate, and effectively use the needed information. We define the ripple effect as the knowledge acquisition through peer communication among members within a small student group. While interpersonal skills are of increasing importance in the workplace, formal incorporation of information literacy in undergraduate agricultural programs is still developing. Thus, it might be of advantage to rely on constructs of social support and active learning. Employers seek individuals with critical thinking skills and the ability to work and collaborate in teams. As a rapidly increasing portion of entry-level jobs in the agricultural industry are replaced with automation, it has become more important that undergraduate agricultural majors enter the workforce with a competitive edge and employable skills. Results suggest the ripple effect in teamwork aids to enhance the students' knowledge of agribusiness information literacy concepts.

1 Introduction

Artificial intelligence and automation in the agricultural industry continue to replace entry-level jobs. Unlike "hard skills" that are quantifiable through degrees and professional licenses, "soft skills" include teamwork, communication, and problem-solving that are not easily replicated by a computer (Noel and Qenani 2013; Society for Human Resource Management 2016). While soft skills have always appealed to employers, decades-long shifts have now made these interpersonal skills especially crucial. Soft skills are important to getting and keeping a job, as they can make the difference between an outstanding and a mediocre employee (Melendez 2019).

Agricultural companies have experienced increasing difficulties finding applicants who are able to communicate clearly, and effectively work on a team with their co-workers, limiting a company's productivity (Noel and Qenani 2013). Research shows that companies are less willing to invest in workers who do not have the soft skills to succeed in the long run, which may be one reason why hiring has lagged its pre-recession pace despite a record number of job openings (Davidson 2016). The increase in the hiring rate since the last recession has been much slower than the job-opening rate, suggesting that the labor market's problems are tied to supply issues. With the labor force participation rate at a 40-year low and employers continuing to express difficulty in finding employees with certain skills, it is likely that the hiring rate will continue to lag behind the job-opening rate (Wilson 2016). Ultimately, current market trends attribute the slowdown in hiring to employers having difficulties finding qualified workers in fields that require both cognitive and soft skills (Deming 2016; Mutikani 2018). Reversing the trend will require that college graduates are prepared with the skills they need for today's labor market (Wilson 2016). Thus, there is a need to emphasize the importance of interpersonal skills in the undergraduate agricultural

curriculum (Sternhold and Hurlbert 1998; Devasagayam, Johns-Masten, and McCollum 2012; Berger 2016).

One way to teach problem-solving skills at the college level is through the construct of information literacy. An "information-literate" student recognizes the need for information and is able to locate, evaluate, and effectively use the needed information (Dunn 2002; Association of College and Research Libraries 2013, p. 2). Information literacy enhances an individual's competency with evaluating, managing, and using information. In fact, various regional and discipline-based accreditation associations consider information literacy as a key outcome for college students (National Forum on Information Literacy 2014).

Previous research suggests that students consider searching information as more crucial than providing a critical evaluation of their findings, and less than half feel confident in their critical thinking abilities (Morrison, Kim, and Kydd 1998; National Center for Post-Secondary Education 2001). Given that market information originates from diffuse sources, it is necessary to locate, compare, and verify information from multiple outlets (Lavin 1995). With the rapid increase in new information technologies, the proficiency in navigating those novel resources becomes especially imperative (Atwong and Hugstad 1997; Benbunan-Fich et al. 2001; Karns and Pharr 2001; Dunn 2002). Information literacy skills are of increasing importance in the workplace and emphasize the need for the formal incorporation of information literacy in undergraduate agricultural programs (Lamb, Shipp, and Moncrief 1995; Morrison, Kim, and Kydd 1998; Johnston and Webber 2003; Schroeter and Higgins 2015).

To teach information literacy, it might be of advantage to rely on social support and active learning, in which the acquisition of knowledge happens in a team of students with cognitive diversity (Reynolds and Lewis 2017). We will call this knowledge acquisition the ripple effect. The ripple effect occurs during the peer communication within a student group where peers with diverse levels of knowledge teach each other when working toward a common grade on a group project. Previous studies suggest that when a high-performing student is working with a low-performing student on a team, the low performer is encouraged to improve and pick up on the skill set of their stronger peers (Topping 2008; Hunt 2017; Shellenbarger 2017). Studies have shown that the team member who takes on the teacher role reinforces their own learning by instructing the students on the team (Briggs 2013). Thus, the ripple effect may provide benefits to both the teacher and the students on the team, and they will be better off working together than they would be individually (Ravanipour, Bahreini, and Ravanipour 2015). To compare the classroom to a working environment, an individual's work performance is based in part on the accomplishments of the coworkers. The drive and skills of employees—or students—is affected by the drive and skills of the people that surround them (Hunt 2017). As such, the ripple effect represents the transfer of information literacy knowledge that takes place when a team of peers, with diverse levels of knowledge, will motivate and teach each other.

The purpose of this study is twofold: (a) describe a teaching case study with college students at a large U.S. university, and (b) highlight how the ripple effect enhances students' level of information literacy. Recent studies have shown that diversity on teams is important for solving high-dimensional, high-complexity problems (Page 2018). An increasing number of employers emphasize that job candidates should be prepared with information literacy and the resulting problem-solving thinking skills (O'Sullivan 2002; Karns 2005). In fact, a large-scale survey determined that more than one third of business executives rank information literacy as the most desired skill (Dunn 2002). This increased emphasis on information literacy skills highlights the opportunity for agribusiness educators to utilize the ripple effect in teamwork to achieve these desired learning outcomes.

2 Background: Teamwork Experiences

According to Harris and Harris (1996), teams are characterized as having a common goal or purpose where members can work together to develop effective mutual relationships to achieve a goal. Francis and Young (1979) identified key characteristics of a high-performing team: the team should produce higher quality work together than they could individually, and peers should use their team members' strengths to

enhance their own abilities. On one hand, teamwork and team-based learning is a valuable tool for information literacy instruction because it increases student learning and provokes problem-solving (Erdem 2009; Jacobson 2011). On the other hand, teamwork in the classroom may involve free riding, where some team members do not put in their share but rather let the rest of the team members carry the bulk of the work. Dysfunctional teams may increase student dissatisfaction because of an uneven distribution of work and poor performance (Scott-Ladd and Chan 2008). Hillyard, Gillespie, and Littig (2010) show that students who had past negative experiences with teams were wary of group projects and seemed to bring animosity toward future teamwork.

Kline's (1999) team player inventory (TPI) is one way to measure positive and negative teamwork experiences. The Kline TPI is a set of ten questions split into five positive and five negative statements dealing with teamwork. Table 1 displays the ten statements of the Kline Team Player Inventory.

In completing Kline's (1999) TPI, a student ranks agreement with each of the ten statements using a scale that ranges from *strongly disagree* to *strongly agree*. The positive statements are scored traditionally, while the negative statements are reversely scored. The sum of these ten questions is taken to generate a TPI score ranging from 10 to 50 points. The higher the TPI score, the more an individual enjoys working in teams and believes that teamwork is beneficial. A score between 10 and 20 points is rated a low preference for teamwork, a medium rating of 21–39 points is expressed as a moderate preference for teamwork, and a TPI above 40 points shows a strong preference for teamwork. A higher TPI score may indicate that the individual enjoys working in teams and that teamwork is beneficial. Using the TPI as a measure of student's interest in teamwork, French and Kottke (2013) found that when team members had similar personalities, TPI was a predictor of teamwork satisfaction. Kline's TPI is internally consistent and has been shown to be a valid tool for measuring teamwork constructs (Ilarda and Findlay 2006).

Table 1: Kline's Team Player Inventory (TPI) Statements

	Statements	Strongly Disagree				Strongly Agree	Positive or Negative Statement
1.	I enjoy working on team/group projects.	1	2	3	4	5	+
2.	Team/group project work easily allows others to not pull their weight.	1	2	3	4	5	-
3.	Work that is done as a team/group is better than work done individually.	1	2	3	4	5	+
4.	I do my best work alone rather than in a team/group.	1	2	3	4	5	-
5.	Team/group work is overrated in terms of the actual results produced.	1	2	3	4	5	-
6.	Working in a team/group gets me to think more creatively.	1	2	3	4	5	+
7.	Teams/groups are used too often when individual work would be more effective.	1	2	3	4	5	-
8.	My own work is enhanced when I am in a team/group situation.	1	2	3	4	5	+
9.	My experiences working in team/group situations have been primarily negative.	1	2	3	4	5	-
10.	More solutions/ideas are generated when working in a team/group situation than when working alone.	1	2	3	4	5	+

2 Methodology

Isolating the ripple effect that may enhance students' information literacy skills involves developing a measurement instrument that accounts for a baseline (pre) and an acquired (post) information literacy skill set.

2.1 Data Collection

We conducted our research at a large (>15,000 students) public university in the Western United States. Each academic year is divided into terms of four quarters that each consist of ten to eleven weeks: Fall (September through December), Winter (January through mid-March), Spring (April through June), and Summer (mid-June through the end of August). We chose an introductory undergraduate agricultural marketing course as a convenience sample. This course selection had several advantages: (1) information literacy skills form a critical component of the course, (2) multiple sections of the course take place during the same term, (3) a wide variety of majors attend the course, given that it is an introductory service class, and (4) the course serves as a prerequisite for most agribusiness classes in the College of Agriculture, Food, and Environmental Science.

Students who need this class as a prerequisite may choose to take this class during their sophomore year, while others may take it during their senior year. For the latter group, this agricultural marketing class might be the only one they take during their college career. Information literacy is an important concept in introductory agricultural marketing classes, given that students are expected to assimilate knowledge and then apply it in subsequent upper-division classes that build on this knowledge. Prior to conducting the research, we obtained the University's Institutional Review Board approval that this study was exempt. Our online surveys did not offer the students any incentive to participate. We collected data from twelve sections of the marketing class over seven quarters. Two instructors with similar teaching styles and identical final projects shared the teaching load of this class. We pretested the survey multiple times in a classroom setting with a small sample of respondents (15–30 participants) to identify and eliminate potential problems. Just as with the final survey, the responses from the pretest were coded and analyzed.

2.2 Measurement Instruments

We collected data at two points in time during the course of one teaching term: at the beginning of the term through a pre-course survey, and then again at the end of the term after completion of the information literacy instruction via a post-course survey. We matched pre- and post-surveys using randomly generated respondent identification numbers.

Our measurement instruments included subjective and objective measures of student learning. Subjective learning was measured via self-assessments where students rated their ability at achieving information literacy objectives. These subjective learning questions were developed from the *Higher Education Information Literacy Standards* (Association of College and Research Libraries 2013). Students rated their abilities on a 5-point scale with endpoints ranging from *needs significant improvement* to *excellent.* Table 2 shows the detail of this subjective knowledge question.

In addition, our survey included objective measures of student learning. We used a series of multiple-choice questions to test the student's ability to locate specific types of information using key databases that students were exposed to during instruction (e.g., Mergent Online, MRI Mediamark, Market Share Reporter). See Table 3 for an example of an objective knowledge survey question.

To supplement the two measures of student learning of information literacy, we assessed each student's predisposition to teamwork, as measured by Kline's TPI. Furthermore, we collected information about each students' university standing, number of credit hours during the term taken by each student,

Table 2. Subjective Knowledge Survey Question

"Assume you are doing an agribusiness marketing class homework assignment that requires you to find information about food marketing. How would you describe your ability to achieve each of the following?"

Survey Question	Needs significant improvement				Excellent
1. Know when information is needed	1	2	3	4	5
2. Know the type of information needed	1	2	3	4	5
3. Locate needed information	1	2	3	4	5
4. Determine if the sources are of high quality	1	2	3	4	5
5. Effectively use information you have found	1	2	3	4	5
6. Properly reference sources	1	2	3	4	5
7. Use the library's online sources	1	2	3	4	5

and gender distribution. To increase the explanatory power of the findings with regard to student learning, we collected information about each student's grade point average (GPA, measured on a 4.0 scale), following Bacon and Bean's (2006) suggestion of using GPA in marketing education research studies.

2.3 Design and Procedures

To determine the impact of the ripple effect on students' information literacy, a final agricultural marketing team project served as the vehicle to teach and assess information literacy. At the beginning of the course, students self-selected into groups of three to five members. The student teams completed the final project to gain applied information search experience and to develop their critical thinking, written and oral presentation skills.

Our dedication of additional time and resources to the final course project was fueled by the desire to improve the use of academic library resources. Previous research suggests a perceived barrier to getting students to access the library resources in order to perform their research project (Macklin 2001; Dugan and Fulton 2012).

Table 3. Example Questions Used as Measures of Objective Learning of Information Literacy

Question	Answer Choices	Correct Answer
1) Which database would you most likely use to determine a product's parent company?	a) Hoovers b) U.S. Census c) MRI+ Mediamark d) Gale Marketshare Reporter e) I do not know, uncertain	a) Hoovers
2) What database would you most likely use to determine food industry trends?	a) MRI+ Mediamark b) U.S. Census c) MarketResearch.com d) Gale Marketshare Reporter e) I do not know, uncertain	a) MarketResearch.com
3) Which resource provides indices that show the likelihood of a consumer to purchase a certain product?	a) First Research b) Hoovers c) ABI/Inform d) MRI+ Mediamark e) I do not know, uncertain	b) MRI+ Mediamark

Table 4. Library Course Guide

Category	Resource
Company Information	Mergent Online
	ABI Inform
	Wards Business
	Brands and Their Companies
Industry Information	Mergent Intellect-First Research
	Mergent Online
Market Research and Consumer Demographics	Market Share Reporter
	MRI Mediamark
	Factiva
	Global Market Information Database: GMID
	US Census
Product Information	USDA National Nutrient Database
News and Data	ProQuest Newsstand
	LexisNexis Academic
	Google News
	USDA Economic Research Service

Instead of just sending the students to the library to complete their information search for the final project, we set aside a full two-hour class for a crash course on key marketing databases. The two-hour class aimed to ensure that each student could learn how to effectively access the necessary databases to complete the final term project. Thus, the course project created a symbiosis between essential agricultural marketing research skills and the library's information assets. Table 4 displays the list of library course guide databases assigned to the students to retrieve the necessary data to complete the final term project.

The project asked the student groups to analyze the marketing and supply chain of a branded food product. Each student team prepared an analysis showcasing the strengths, weaknesses, opportunities, and threats (SWOT) of the product's performance in the agribusiness marketplace, backed up with facts, including sales and market share information. In addition, student teams defined the product's target market and recommended changes to the marketing mix.

Overall, the final project honed information literacy skills by requiring the use of agricultural marketing information databases. Student teams recommended changes to the marketing mix based on the food product's performance and trends in the agribusiness marketplace. At the end of the course, the project was submitted as a two-page infographic, complemented with a short team presentation to the class (Schroeter and Higgins 2015).

3 Results

Table 5 shows the results from the survey, with regard to demographic, academic, and Kline's TPI information. Within the sample of 544 students across twelve sections of the agricultural marketing class, 139 teams formed to work on the final information literacy project. Given the total class enrollment of 600, this leads to a response rate of 90.67 percent. Of the 544 students sampled, 50.74 percent were female, consistent with the gender breakdown in the college's enrollment (California Polytechnic State University Enrollment UGRD GRAD Profile 2016).

Students in the sample spanned from freshmen to seniors. However, juniors and seniors largely dominated this sample, at 44.68 percent and 26.60 percent of the group, respectively. Sophomores

Table 5. Teamwork, Academic, and Demographic Information

Variable	Categories	(*n* = 544)
Teamwork		
Response rate	Enrollment	600
	Response Rate	90.67%
Number of teams		139
Kline's TPI (0–50)	≥40	15.81%
	21–39	82.17%
	0–20	2.02%
Final project grade		82.21%
Average Correct Information	Pre-survey	30%
Literacy Questions	Post-survey	61%
Average Self-Rated Information	Pre-survey	3.61
Literacy Ability (out of 5)	Post-survey	4.12
Academics		
Academic standing	Freshmen	3.19%
	Sophomore	25.53%
	Junior	44.68%
	Senior	26.60%
Average credit hours during quarter		15.39
Required course		88.05%
Agribusiness Major		59.01%
GPA	3.51–4.00	9.01%
	3.01–3.50	27.39%
	2.51–3.00	42.28%
	2.01–2.50	16.73%
	Less than 2.00	2.02%
Demographics		
Gender	Male	49.26%
	Female	50.74%

represented 25.53 percent of the sample, while freshman represented just 3.19 percent of the sample. This undergraduate food and agricultural marketing class was required for 88.05 percent of the students in the class, and the majority of the students majored in agribusiness. The average GPA of the students in the sample was 2.89 prior to the start of the course. The majority of students had a GPA between 2.51 and 3.00, with the second highest group showing GPAs between 3.01 and 3.50.

In the pre-survey, students scored low on the objective portion, which was consistent with their initial lower ratings of information literacy ability. Students averaged 30 percent correct answers on the objective knowledge questions. The post-survey showed that by the end of the quarter, scores increased to 61 percent correct responses, a statistically significant difference (p = .000). Along with the objective

knowledge increase, the subjective knowledge increased. The self-rated information literacy ability showed a significant increase with an average pre-survey value of 3.61 (out of 5), and the average post-survey ability of 4.12 (please see table 2 for details about the question and end points).

Kline's TPI measures the extent to which an individual group member is positively or negatively predisposed to teamwork. The average student TPI was 33.74 (out of 50), which indicates a moderate preference for teamwork. The majority of the students (82.17 percent) had a TPI between 21 and 39, while 15.81 percent of the students scored a TPI greater or equal to 40, showing a strongly positive attitude toward teamwork. Only 2.02 percent scored a TPI lower than 20, which means a negative predisposition toward teamwork. Table 6 shows the average scores on each of Kline's TPI statements.

The two statements that ranked highest were positive statements, where both of the statements assessed the creative nature of teamwork. With an average score of 4.15 out of 5, the statement "More solutions/ideas are generated when working in a team/group situation than when working alone" ranked highest. The statement "Working in a team/group gets me to think more creatively" ranked second, with an average score of 3.77. Students rated two negative statements lowest, with the bottom statement implying the free rider issue of teamwork "Team/group project work easily allows others to not pull their weight" with a value of 2.0.

The post-survey asked students to rate their perceived influence of various course resources on their individual acquisition of information literacy knowledge. Using a 5-point scale, where 1 = *not at all influential* and 5 = *extremely influential*, students rated how much various class elements contributed to their learning of information literacy: library course guide session on the databases, final course project, course assignments, and prior experiences. Students rated the final course project and the assignments as the most influential aspects with regard to their acquisition of information literacy knowledge. Out of a total of 5 points, the course project was rated as the most influential element with an average score of 4.33, with the course assignments rated as 4.01, and the library database session at 3.83.

4 Limitations and Directions for Future Research

It is typical for a single instructor to show variations in energy, mood, and level of knowledge between terms, and possibly even weeks of instructing a single course. Thus, while we attempted to standardize the class instruction, there was a natural variation within the class due to the two instructors' different personalities. Another potential limitation is that we do not know whether individually assigned projects would have led to similar results. Thus, one direction for our future research could compare the level of information literacy acquired through individual versus teamwork.

We provide a unique contribution to the literature by providing a teaching case study and collecting data to assess how to enhance information literacy in agricultural marketing research. The availability of

Table 6. Kline's TPI Statements (Average = 34, *SD* = 6.16)	
Kline's TPI Statement	**Mean (*SD*)**
More solutions/ideas are generated when working in a team/group situation than when working alone.	4.15 (*0.88*)
Working in a team/group gets me to think more creatively.	3.77 (*0.94*)
Team/group work is overrated in terms of the actual results produced.	3.65 (*0.99*)
My experiences working in team/group situations have been primarily negative.	3.63 (*1.07*)
I enjoy working on team projects.	3.53 (*1.02*)
My own work is enhanced when I am in a team/group situation.	3.33 (*0.99*)
Work that is done as a team/group is better than work done individually.	3.30 (*0.94*)
Teams/groups are used too often when individual work would be more effective.	3.18 (*0.98*)
I do my best work alone rather than in a team/group.	2.72 (*0.96*)
Team/group project work easily allows others to not pull their weight.	2.00 (*1.03*)

this information will guide utilizing teamwork in student learning of information literacy. Future research opportunities may explore the role of team dynamics on information literacy in order to understand the contexts that contribute to the success of one team versus another.

5 Conclusions and Implications

Our study presents a unique contribution to previous research in three areas: first, our study presents a case study of utilizing teamwork with college students. Based on their TPI scores, students indicated an overall positive predisposition to teamwork, indicating the creative problem-solving nature of teamwork. Student teams with varying backgrounds, skills, and learning abilities might provide a working environment that poses a greater opportunity to learn from one another. Furthermore, this group work setting might be more effective than other course elements, resulting in each student improving their knowledge of the assigned course work. Students indicated that the final group project was most influential in contributing to their information literacy skills. Compared with the pre-course survey, students doubled the percentage of correct project knowledge questions on the post-course survey. This finding confirms past research that suggests that students benefit by learning directly from a peer because of the created team learning environment functioning as a constructive and supportive way to enhance learning and inner motivation (Nielsen, Johansen, and Jørgensen 2018). High-performing students may benefit by reinforcing their own knowledge by instructing lower performers in the group (Fuchs, Fuchs, Hamlett, and Karns 1998; Briggs 2013). The added exposure of the peer communication relationship creates an additional tool for students to increase their information literacy skills. Hanken (2016) suggests that peer learning is beneficial for students in higher education, especially when applied to a real-world learning opportunity.

Second, our study emphasizes the potential of group work to improve information literacy and learning outcomes, with the goal to make agribusiness students more employable and competitive in a working environment. Paired with the final project on information literacy, teamwork may be an additional tool to enhance critical thinking—a valued skill among new hires. When students work together, they take part in cultivating a shared acceptance of a common goal and in joint problem-solving (Gaunt and Westerlund 2013; Nielsen, Johansen, and Jørgensen 2018). The ripple effect may advance the positive impact of teamwork even further, demonstrating the impact of teamwork on an individual's level of information literacy. Critical thinking, group collaboration, and problem-solving are among the most desirable traits for new hires in the agribusiness labor market (Noel and Qenani 2013). Employers could take advantage of this finding because teamwork serves as an additional tool to enhance other valuable skills. Consequently, to prepare a strong applicant pool, it is necessary for college students to evolve and learn information literacy skills to keep up with industry standards.

Third, with the digital age consuming students in full force, employers and educators have expressed a need for individuals to understand the quality, credibility, and effectiveness of the information they are finding (Korobili and Tilikidou 2005; Blaszczynski, Haras, and Katz 2010; Devasagayam, Johns-Masten, and McCollum 2012). Today's social media and other sources present the idea of "fake news," which often deceives students by passing as authentic information. Popular search engines, such as Google, customize searches, which filter results based on what you are more likely to click rather than what the most common results are for the particular search (Pariser 2012). Therefore, learning soft skills such as information literacy, is crucial to prepare students to evaluate and analyze the plethora of information that is available to them.

Given the nature of our study, the data provides the grounds for worthy discussion about the role of information literacy in undergraduate agricultural education and the teaching methods that may enhance critical thinking. Employers in the agribusiness industry seek individuals with strong critical thinking and good communication skills, and those who can effectively work with teams (Boland and Akridge 2004; Travis 2011; Noel and Qenani 2013; Berger 2016). These skills even surpassed some of the most sought-out tools agribusiness undergraduate programs tend to focus on, including knowledge of

markets, accounting, finance, and even internship or work experiences (Boland and Akridge 2004). Teamwork, the third most in-demand job skill (Berger 2016), reinforces the relevance of our research in regard to the competency of new hires. Working with others is a desired skill at all aspects of every job; no matter the industry, function, or level of superiority, teamwork remains to be at the core of operation (Travis 2011; Berger 2016). Strengthening the information literacy skills of undergraduates' in conjunction with teamwork will give students the opportunity to market themselves as a competitive perspective employee in the job market.

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