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Helping Students to Become Effective Learners: Early Evidence on Embedding Learning Skills Instruction in Content Coursework

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Abstract
The current research is part of an ongoing research project—*Creating a Culture of Learners*—which aims to help institutions equip students to become better learners. An exploratory, pre-post design was used to examine changes in student learning when embedding learning strategies within a content course required for all new students at a liberal arts institution in the Midwest. Dependent t-tests were conducted to evaluate change between the pre- and post-tests. Two years of data are included. Results indicate statistically significant gains with moderate effect size. Our findings suggest that embedding learning strategies is a promising strategy for improving student learning. We also include suggestions for learning strategies as a part of the regular classroom instruction and curriculum.

Keywords
student learning; deep learning; study skills; college students; embedded instruction; student success; transition to college

Introduction

This article details an exploratory research study which examined the impact of teaching students how to improve their learning as part of the regular classroom instruction. Additionally, this particular study flows from a larger research initiative, which seeks to establish a culture of students who truly embrace and promote learning as a part of their education experience. In order

to provide context for the current study, we will first briefly discuss the overarching research initiative.

Creating a Culture of Learners Initiative

"Higher education's fundamental purpose is to *educate* people, to equip them with appropriate knowledge, skills, and other personal qualities that enable them to perform critical functions in the society and be responsible citizens," according to Astin (2016, p. 37). Kuh et al. add that "having a college degree is a hollow accomplishment if one does not acquire in the process the skills and competencies demanded by the 21st century" (2010, p. ix). Consequently, this places a weighty expectation upon students, as Conley and French (2014) note: "[T]he world that today's young people are entering is one that will continue to change rapidly and that will make demands on them to be true lifelong learners. Their ability to take ownership of their learning will be key to their success not only in school but throughout their lives" (p. 1031). Given the societal conditions that will require people to adapt to the ever-changing world, educational institutions must endeavor to enhance students' aptitude for learning not only during their academic career but also throughout life. To this end, higher education institutions should make every effort to help students become intentional learners.

Educational institutions can make good on their responsibility to help students make the most of their academic experience while also providing them with the skills to be effective learners. Kuh and his colleagues (2010) set forth to study and understand those institutions which distinguished themselves in helping students learn and succeed. The results of this project, known as *DEEP* (Documenting Effective Educational Practice), are detailed in their book *Student Success in College: Creating Conditions that Matter* (Kuh et al., 2010). One of their findings is that *DEEP* schools do a remarkable job of acting upon their commitment to student learning and that it is part of the institution's culture. These schools have "an unshakeable focus on student learning" and make "valuing undergraduate student learning" a priority of practice (p. 65).

If colleges and universities are going to equip students to succeed in college and be lifelong learners, then a genuine valuing of learning and the learning process must be a part of the institution's culture. According to Schein, organizational culture is the "pattern of shared basic assumptions learned by a group as it solved its problems of external adaptation and internal integration … therefore, to be taught to new members as the correct way to perceive, think and feel in relation to those problems" (Schein, 2010, p. 18). Similarly, Kuh et al. defined higher education culture as:

> A widely shared, generally enduring set of beliefs and values represented by the language people use; institutional norms and established patterns of behavior by students, faculty, administrators, and others; and certain aspects of the physical environment that manifest institutional values and priorities. Taken together, these properties represent accepted patterns of thinking and behaving that tend to become shared among faculty, staff, and students at the institution. (2010, p. 341)

Germane to institutional culture are beliefs and values, patterns of thought and behavior, and shared language. Consequently, these should emphasize student learning if institutions are to create a culture of student learning.

Due to the need for institutions to teach students to be lifelong learners and the vital role that culture plays within an institution, our research team set out to better understand how to equip students to know how to learn and also establish a student culture that values learning and the learning process. Our efforts have included a review of the literature, multiple pilot research projects, feedback from practitioners, and input from students. The aim of our ongoing research is to assist colleges and universities in their endeavor to teach students how to learn. The ultimate goal of our initiative is to simply equip students to be effective learners during their time in college, in hopes of not only increased college success, but also developing learning tools that will benefit them the rest of their life. Furthermore, our research is built upon two considerations: "the critical role students play in their own learning" (Mayhew et al., 2016, p. 101) and "the very act of being engaged [while in college] also adds to the foundation of skills and dispositions that is essential to live a productive and satisfying life after college" (Carini et al., 2006, p. 2).

Although, our research is still in its infancy, based on results of our pilot research projects and feedback from students, it seems we are heading in a positive direction. To date, we have identified nine factors associated with facilitating improved learning. We refer to these as *learning elements*. We found it helpful to group these into two categories based on commonalities. One of the categories, the *dispositions for deep learning*, is organized around the shared theme of attitude whereas the other category, *connections for deep learning*, is organized based on the shared theme of making connections. We have intentionally labeled both categories with the term "*deep learning*." The decision to do so stems from the consistency of the learning elements and the ideas within the field of deep learning (see Biggs & Tang, 2009; Kuh et al., 2010; Tagg, 2003; Weimer, 2013). The following is a brief overview of these learning elements.

Dispositions: Attitudes for Deep Learning

Attitude plays an important role in the learning process. Farrington et al. conclude "by helping students develop the noncognitive skills, strategies, attitudes, and behaviors that are the hallmarks of effective learners, teachers can improve student learning and course performance while also increasing the likelihood that students will be successful in college" (2012, p. 72). Often an attitude seems to be a reflective response, yet we must keep in mind that it can be changed and intentionally developed. Consequently, students can make a conscious choice to develop dispositions that aid in the learning process. Goodwin and Hein (2016) capture the impact of attitude towards learning: "Perhaps the most important noncognitive factor related to student success is a can-do spirit—feeling capable as a learner and able to achieve one's goals" (p. 77). Through our review of the literature, research projects, interactions with practitioners, and feedback from students, we identified numerous attitudes associated with learning. Through an evaluation process, including combining the attitudes based on similarities, we were able to identify those attitudes that seemed to have the most benefit for effective learning. These included active engagement, love of learning, willingness to fail, inquisitiveness, and intentional effort.

Whereas student involvement refers to the "amount of physical and psychological energy that the student devotes to the academic experience" (Astin, 1999, p. 518), student engagement emphasizes the "amount of time and effort students put into their studies and other activities that lead to the experiences and outcomes that constitute student success" (Kuh et al., 2010, p. 9). Taken together, it is no surprise that the time, effort, and energy students put into their academic endeavors greatly impact their learning and academic success. Furthermore, according to Carini et al., "the premise

[of student engagement] is deceptively simple, perhaps self-evident: The more students study or practice a subject, the more they tend to learn about it" (2006, p. 2). Building off of these definitions, for the purpose of our research, we defined *active engagement* as the time and effort, especially the mind at work or in essence mental energy, which students put into their learning. Our concept of active engagement stems from the importance of keeping students cognitively active in their learning (Biggs & Tang, 2009; Boser, 2017; Doyle & Zakrajsek, 2013; Kuh et al., 2010; Michael, 2006; Weimer, 2013). Furthermore, an essential aspect of active engagement, as we have defined it, is the prominence of reflection—spending time thinking about what is being learned.

Love of learning is derived from intrinsic motivation and is characterized by finding joy in what is being learned and or in the learning process. Zull asserts that based on neurological research, "we [teachers] must find ways to make learning intrinsically rewarding," adding, "Learning should feel good, and the student should become aware of those feelings" (2004, p. 70). According to Ryan and Deci (2000), "to be motivated means *to be moved to* do something" (p. 54) and intrinsic motivation, one type of motivation, "refers to doing something because it is inherently interesting or enjoyable" (p. 55). They claim "intrinsic motivation results in high-quality learning and creativity" (Ryan & Deci, 2000, p. 55). Whereas something of interest or enjoyment motivates, the opposite is true as well—people are much less likely to engage in things they find unenjoyable or loathsome. Consequently, it is very possible that students may need to be taught how to find joy in learning. As Tagg notes, "whatever else a college education may do, if it does not teach students to enjoy substantive and challenging learning, it will be largely pointless in the long run" (Tagg, 2003, p. 80). Taken together, when students find the content and or the learning process something to enjoy—even if this is a choice—then they are more likely to engage in learning.

Willingness to fail is understanding that failure is a natural part of the learning process and that failure should be utilized to help facilitate learning. Much has been written about the importance of failure in the learning process. For example, an inherent part of Carol Dweck's (2006) concept of growth mindset—the "belief that your basic qualities are things you can cultivate through your efforts" (p. 7)—is the necessity and benefit of failure. Burger and Starbird (2012) identify failure as one of the five elements of effective thinking. Their chapter "Igniting Insights through Mistakes: Fail to Succeed" details the importance of failure and includes strategies for utilizing failure. Another example comes from Ken Bain's (2012) research on successful college students. Bain asserts that "people who become highly creative and productive learn to acknowledge their failures, even to embrace them, and to explore and learn from them" (2012, p. 100).

The disposition of *inquisitiveness* draws on curiosity as well as asking questions. As we wrestled with outlining the dispositions, we consistently identified, in both existing literature and our research, the dual role of asking questions and being curious. Initially, we first kept these separate. However, as we continued to teach them to students and assessed them as a part of our research on the learning process, it became more evident that they needed to be combined into one disposition, which we have labeled as inquisitiveness. Therefore, the disposition of inquisitiveness is defined as the combination of curiosity and asking questions. This disposition emphasizes developing curiosity through asking questions and using questions to develop curiosity. Berger (2014) captures this interaction: "[T]he Pulitzer Prize-winning historian David Hackett Fischer observed that questions 'are the engines of intellect—cerebral machines that convert curiosity into controlled inquiry'" (p. 15).

Learning outcomes are positively linked to student effort (Mayhew et al., 2016). Successful students understand that learning requires hard work and are willing to do this (Bain, 2012). Our disposition of *intentional effort* not only acknowledges that students must work hard but also takes into consideration that there are effective ways of studying. A good example of working hard while also working smart is self-regulated learning, which is "an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and the contextual features in the environment" (Wolters et al., 2005, p. 5).

Deep Learning: The Importance of Making Connections

Similar to the dispositions, the *connections for deep learning* were derived from literature, research, and practice. The connections were widely influenced by Bloom's taxonomy (Bloom & Krathwohl, 1956), the revision of Bloom's Taxonomy (Krathwohl, 2002), cognitive learning theories (see Schunk, 2012), and deep learning approaches (Biggs & Tang, 2009; Ramsden, 1992; Tagg, 2003). The connections identified and used in our research initiative emphasized associating, relating, and linking as ways to organize and structure content being learned and as a formative part of a learning process. Although the connections originated through literature, the following definitions are the outworking of our research and work with students. The connections for deep learning include: holistic, progression, synthesis, and application.

Holistic is relating the parts to the whole and vice-versa. It can commonly be referred to as the big picture. *Progression* is relating new content to previous content and learning while also anticipating what is next. In other words, progression is intentionally connecting what came before to what is currently being learned and what comes after. *Synthesis* is making connections through similarities and differences, commonly referred to as compare and contrast. Lastly, *application* emphasizes putting learning into practice—to take what is being learned and do something with it.

The Interaction of the Dispositions and the Connections

Although it is feasible and appropriate to treat each factor individually, especially when teaching them, it is important to note, we have found throughout our research and teaching that learning is greatly improved through the interaction of the learning elements. Here are a few examples. First, the effectiveness of the learning process increases by spending time thinking about (*active engagement*) the interconnectedness of the content (*any of the deep learning connections*). Boser (2017) refers to this—thinking about a topic's underlying connections—as thought experiments and asserts that this is how mastery occurs.

In another example, from the book *A More Beautiful Question,* Warren Berger (2014) recounts Van Phillips' approach to prototyping his prosthetic foot. According to Berger, Phillips took the perspective "rather than run from a failure or try to forget it ever happened, hold it to the light and inquire, *Why did the idea or effort fail? What if I could take what I'm learning from this failure and try a revised approach?*" (Berger, 2014, pp. 123-124). We suggest that Phillips' perspective to learning can be understood through the interactions of the elements: *willingness to fail* and *inquisitiveness*. In other words, Philips uses an attitude of curiosity, marked by asking questions, in the midst of failure as a necessary and helpful part of the learning process—all factors present and connected.

A very practical example within higher education is detailed in Schoper's article "Helping Students Become Self-Mentors" (2017). The article describes an assignment used to increase student ownership and engagement in their education and professional development. The premise of the assignment is that "it is important for students to understand that learning is not a passive process, and that their participation in it [their learning] will enhance their ability to do it" (2017, p. 2). The assignment, titled "Effective Engagement in Active Learning," includes goal setting and reflection. We suggest that learning elements represented in this assignment include *active engagement* and *intentional effort*.

A final example is found in the highly respected article "Seven Principles for Good Practice in Undergraduate Education" (Chickering & Gamson, 1987). The authors stress that students "must talk about what they are learning, write about it, relate it to past experiences and apply it to their daily lives. They must make what they learn part of themselves" (p. 5). Relating and applying, especially to daily life, are ways to make *connections*, while talking and writing about what is being learned are forms of *active engagement*. Consequently, bringing these together so that students are talking and writing in connected ways about what they are learning enhances the learning process and helps students to improve their learning. As an aside, yet a valuable consideration, as the needs and demographics of students enrolling in higher education change, there is a similar call for institutions to draw upon the contexts and experiences of students' daily lives to make their education more relevant and consequently valuable (Keeling, 2004).

As previously mentioned, our initiative is in its infancy as we continue to explore how to more effectively equip students to improve their learning and how to create a student culture which embraces learning and the learning process. Our initiative has included an extensive review of the literature, multiple pilot studies, interviews and focus groups with students, and also input from practitioners. From this, we have reason to believe that the nine elements—five dispositions for deep learning and four connections for deep learning—are effective strategies for equipping students to improve their learning. Our overarching research initiative on creating a culture of student learners seems to have promise for equipping teachers to help facilitate student learning and also for equipping students to become more effective learners.

The Current Study

The purpose of this current study is to examine any changes in students' learning factors when students are taught how to be more effective learners as part of the regular classroom instruction. All of the aforementioned learning elements were explicitly taught and also embedded within the content of a course. Student learning was defined and measured by three factors—awareness, understanding, and mastery—with each factor representing a unique level in learning. We also combined the factors to create an aggregate measure (see Instrumentation section for further discussion). We hypothesized that teaching students the learning elements as a means for equipping them to be more effective learners would have a positive impact on their levels of awareness, understanding, and mastery.

The results of this current study revealed that students experienced statistically significant increases in each of these three factors from early in the term to later in the term. Because of these promising results, we want to share them with researchers and instructional faculty. Researchers should consider conducting future studies needed to increase confidence in the efficacy of the nine

learning elements. For example, such studies could determine the concurrent or predictive validity of our instrument used to establish awareness, understanding, and mastery, while others should consider using a control-experiment design with random assignment of subjects to treatment and control conditions. One of our greatest challenges in assessing the efficacy of the elements was that our study was conducted within a course having constraints that prevented us from using an experimental design with random assignment of subjects to treatment and control. We provide this description to offer guidance to researchers interested in conducting the previously delineated future studies. We also present it to assist instructional faculty who want to use the learning elements in courses they teach. We now turn our attention to a more detailed description of the current study.

Context and Participants

This research was conducted at a liberal arts institution in the Midwest. The institution has approximately 2,000 students, of which approximately 17% are people of color. There is also a slightly higher female than male population. Average high school GPA is 3.78, 37% graduated in the top 10% of their graduating class, and they earned an average ACT composite of 27.

All first-time students, including transfer students, are required to enroll in a four-credit-hour survey course on the purpose of the liberal arts that also emphasizes strategies for success during the transition to college. This course has been a part of the university's curriculum for over forty years. Six years prior to our research, it went through a major revision. The course is offered only during the fall semester and meets four times per week for 50 minutes for 15 weeks with one additional week reserved for final exams. The course is delivered through three distinct experiences.

- *Large group lecture delivered by faculty*. Twice per week students attend a recitation delivered by university faculty. There are four sections with an average enrollment of 125 students. During these sessions, students receive instruction on the meaning and purpose of the liberal arts.
- *Small group lecture and discussion taught by faculty*. For this delivery, each of the four large group sections is divided in half, resulting in a total of eight sections with an average enrollment of 65 students. The purpose of this experience is to allow further discussion of the large lecture content, additional instruction, and opportunities to interact with peers regarding the transition to college. The small group lecture occurs once per week.
- *Peer-led discussion*. The remaining experience is a peer-led discussion group, which students also attend once per week. Each of the small group lecture sections is divided into fourths to create peer groups with an average size of fifteen students. Two undergraduate students lead the peer discussion groups. The peer leaders have previously taken the course and are selected through an interview process. Peer leaders are required to enroll in a course on facilitating learning, and they receive extensive instruction and support throughout the semester. Discussion content focuses on key points from the large and small group lectures.

Data were collected during the fall 2018 and fall 2019 semesters. A total of six faculty and approximately seventy-four peer leaders were involved in the course each year. The nine learning elements were explicitly taught, integrated into the course content, and reinforced throughout the semester.

Although enrollment in the course is mandatory, participation in the research was voluntary. All students were required to take the pre- and post-test measures but could opt to have their data not be included in the official research study. During fall 2018, 532 students were enrolled in the course; of these, 253 (48%) fully completed the pre- and post-tests and agreed to participate in the research; for fall 2019, there were 524 students with a participation of 362 (69%).

Instrumentation: Evaluating Student Learning

One of the challenges we faced was how to evaluate student learning. As a starting point for identifying measures of learning, we used Schunk's (2012) definition of learning: "an enduring change in behavior, or in the capacity to behave in a given fashion, which results from practice or other forms of experience" (p. 3). We conceptualized that learning occurs along a continuum and considered this to include an interplay between content and authorship: Content included progressing from rudimentary or basic to breadth and depth of complexity; authorship was considered as progressing from external or relying on others to relying upon self[1]. Consequently, we operationalized learning to include three categories which accounted for this interaction between Schunk's definition and the progression on the continuum. These categories were awareness (basic content; reliance on others) and mastery (depth/complexity of content; have taken ownership of learning), which anchored the continuum. The category of understanding (moderate content; developing responsibility for learning) was conceptualized to be between awareness and mastery and to reside in the middle of the continuum.

Awareness represented the starting point of the continuum along with the lowest level of the definition of learning. It is appropriate to think of someone in this category as a novice. Most students begin their experience in a course at the level of awareness—trying to develop a sense of the course including content and also relying on others (e.g., teacher) in the learning process. Thus, the first step then in the learning process is to develop familiarity—with the course, expectations, and content—while also developing a comfort with themselves as learners in the course. It is feasible that some students may continue in the awareness category, floundering along, not being able to make sense of the course, content, their role in it, or who they are. Consequently, students who remain in a low level of meaning making—not only a basic level of content knowledge but also relying upon others for constructing meaning—may feel "lost" as the course progresses.

As students grow in their learning and meaning making, they progress from familiarity to what we classified as understanding. Understanding represents a moderate level of content knowledge and also meaning making. In essence, students have a sense of confidence stemming from their comprehension of the course content and have developed more responsibility for their learning—finding their voice in the course.

[1] A great amount could be written about transformational learning, meaning making, and self-authorship, much of which is beyond the scope of this article (see Baxter Magolda, 2009; Hodge et al., 2009; Keeling, 2004). As we grappled with how to define learning, we were very committed to respecting 1) level of content and 2) student ownership or voice. Although, this could be viewed as a quadrant matrix with high/low content and high/low student voice, we opted for a linear view of a learning expressed on a continuum anchored by the interplay or combination of basic content and dependence on others progressing towards a depth of content and the ownership of learning—or finding one's voice in the learning process.

Lastly, mastery represents the highest level of learning. Students have developed an understanding (previous "stage" on the continuum) of the course and therefore perceive they have the skills and ability to experience continued success at a high level. Moreover, they approach their learning with a variety of learning strategies, engagement, and ownership. Consequently, they are finding their own voice—which in turn equips them to develop a deep level of meaning making. It should be noted that mastery can occur early in the semester.

From this conceptualization and operationalization process, we created a 21-question instrument measuring student learning (see Table 1). The instrument used a 7-point scale, where 1 represented "Not at all like me" and 7 was "Very much like me." The instrument included questions for each of the three categories and resulted in four values: one for each category and an aggregate value. Because of the process used to develop the instrument, we believed we were able to establish face validity. Also, the instrument for both the pre- and post-tests proved reliable (see Table 2).

Procedure

In both years, students were administered the pretest at the start of the fifth week of the semester. The purpose of waiting four weeks was to allow students to experience the transition to college, since the vast majority were first-time college students. We reasoned that some experience would help equip students to better understand the expectations and demands of college, enabling them to create a more accurate perception of their preparedness for college. None of the learning elements were taught in the first four weeks. Additionally, as students completed the instrument, they were instructed to identify a course they were currently enrolled in and only think about this course as they completed the instrument. Students could choose to think about the liberal arts survey course that included the learning elements, but they were not required to think about this particular course.

Once the students completed the pretest, then the learning elements were explicitly taught, reinforced, and modeled primarily through the small group lecture sections, although they were also embedded in the large lecture and peer discussions. A variety of instruction methods were used throughout the semester to help students know and apply the learning elements. At the end of the semester, students were administered the post-test. They were instructed to think about the same course as they did on the pretest.

Table 1

Instrument Development to Assess Learning

Factor	Description
Awareness	I pay close attention in class
	I am alert in class
	I am often not aware of what is taking place in class*

	If asked in the evening, I remember what we learned in class that day
	I talk with my peers/classmates outside of class about what I'm learning
	I take ownership of my learning
	I develop familiarity with course content
	I know what is taking place in in this course
Understanding	I often don't remember what my professor talked about in class*
	Over time, what I am being taught in class starts to make sense
	I believe I understand the content of this course
	I am not able to explain what I am learning in course*
	I know I can comprehend what is being taught in this course
	I often feel confused with the content in this course*
Mastery	I can teach others what I learn in class
	I am not confident that I could tutor a peer in what I learn in this course*
	I feel like I master the content in this course
	I have confidence that I truly learn the material in this course
	I develop a strong command of the content in this course
	I apply what I'm learning in this course to my other courses
	I apply what I'm learning in this course to other areas in my life

Note. *Reverse score item.

Table 2

Cronbach's Alpha

Item	2018 Pre	2018 Post	2019 Pre	2019 Post
Awareness	0.817	0.853	0.777	0.848
Understanding	0.790	0.772	0.776	0.816
Mastery	0.848	0.855	0.829	0.874
Composite	0.909	0.923	0.897	0.931

Note. According to Nunnally (1978), *0.70 or higher is sufficient for early stages of research.*

Results

Dependent t-test analysis was used to evaluate the results from the student learning instrument. The purpose for using dependent t was to evaluate if there were differences in the means between the pre- and post-tests administered to the same participants. The use of the dependent t-test also accounts for the characteristics of the individuals taking the pre-and post-tests. Steps were taken in the analysis to account for regression to the mean. We used the formula developed by Roberts (1980), which has been used in higher education research (Feldman et al., 1999). Table 3 reports the descriptive statistics for each year. Results indicated statistically significant gains between the pre- and post-tests for each of the factors of learning except for awareness in 2018 (see Table 4). Effect size was also calculated (see Table 5).

Table 3

Descriptive Statistics for Levels of Learning

Year	Learning Category	N	Pre Mean	Pre SD	Post Mean	Post SD
2018	Awareness	253	5.138	0.440	5.190	0.447
2018	Understanding	253	5.329	0.549	5.440	0.523
2018	Mastery	253	4.244	0.754	4.613	0.721
2018	Composite	253	4.853	0.524	5.057	0.526
2019	Awareness	362	5.086	0.496	5.325	.0496
2019	Understanding	362	5.198	0.502	5.499	0.487

2019	Mastery	362	4.111	0.616	4.805	0.620
2019	Composite	362	4.760	0.508	5.193	0.530

Table 4

Dependent T-Test for the Levels of Learning

Year	Learning Category	Mean Difference	SD	t	df	sig
2018	Awareness	0.052	0.439	0.874[+]	252	0.062
2018	Understanding	0.111	0.506	3.495	252	0.001
2018	Mastery	0.369	0.625	9.381	252	0.000
2018	Composite	0.204	0.465	6.971	252	0.000
2019	Awareness	0.239	0.468	9.710	361	0.000
2019	Understanding	0.301	0.505	11.335	361	0.000
2019	Mastery	0.694	0.596	22.161	361	0.000
2019	Composite	0.433	0.476	17.329	361	0.000

[+]Awareness 0.874 (t is below one—more noise than pattern)

Table 5

Effect Size for Levels of Learning

Year	Learning Category	Cohen's d	Interpretation
2018	Awareness	0.118	x
2018	Understanding	0.219	small
2018	Mastery	0.590	medium
2018	Composite	0.439	medium
2019	Awareness	0.511	medium

2019	Understanding	0.596	medium
2019	Mastery	1.164	large
2019	Composite	0.910	large

As we consider the results, there were statistically significant differences in the factors of learning between the pre- and post-tests, with the exception of *awareness* in 2018. Moreover, effect sizes were medium to large with the exception of *understanding* in 2018. Thus, we conclude that students report improvement in their learning over the course of the semester. Furthermore, gains were made from 2018 to 2019. For example, pre- to post-test differences in *awareness* were not statistically significant in 2018 but were in 2019. Also, effect size improved across all categories from 2018 to 2019. Thus, it seems embedding the learning elements as part of the instruction helped students to improve their learning.

Additional analyses focused on whether the learning elements helped to improve student learning. We believed it important to consider further analyses because the lack of a control group made it impossible to conclude with certainty that the change from pretest to post-test could be attributed to the teaching of the learning elements. In particular, we were able to control for instructor and also transfer students. Although the elements were embedded in the large group lecture and peer discussion, the primary instruction and reinforcing of the elements occurred in the small group lecture sections. Three faculty members taught the eight small group sections in 2018 and the same three faculty taught the nine sections in 2019. Two of the instructors had prior experience and expertise with the elements, whereas one instructor did not.

We conducted an Analysis of Variance (ANOVA) using the compiled score of the awareness, understanding, and mastery subscores to evaluate differences among sections for each respective year and also differences in instructor. Since the data was normally distributed, Bartlett's test of homogeneity of variances was used and revealed no significant difference between the variances. Tukey was used for the post hoc mean comparisons. Descriptive statistics results for the analysis of the sections of the course are presented in Tables 6 and 7. Descriptive statistics for 2018, the first year the elements were taught, revealed lower change scores (i.e., difference in post- minus pretest compiled scores) for the sections of the course taught by the novice instructor as compared to the two expert instructors (see Table 6). However, for 2019, year two, descriptive statistics showed little difference between the sections for all three instructors (see Table 7). The ANOVA for the 2018 sections was nearly statistically significant at the $p < .05$ level, $F(7, 245) = 1.992$, $p = 0.057$. The Tukey HSD post hoc comparisons revealed near differences at the $p <. 05$ level for two sections: 1 and 4, mean difference = 0.310, $p = .068$; and also for sections 1 and 8, mean difference = 0.310, $p = .108$. Sections 4 and 8 were taught by the novice (see Table 6) indicating almost statistical significance between the change scores from the novice sections as compared to the higher change scores from two of the sections taught by an expert. However, the ANOVA for year two (2019) was not statistically significant.

Additionally, all sections were grouped per year by respective instructors. Results from the instructor analysis are presented in Table 8. Descriptive statistics indicate differences in the means between instructors for 2018 and the ANOVA confirmed these were statistically significant at the $p < .05$ level, $F(2, 252) = 4.117$, $p = 0.017$. The Tukey HSD post hoc comparisons revealed

differences at the $p < .05$ level for the novice and one of the experts, mean difference = 0.196, $p = .014$. However, there was no statistical significance for year two.

In summary, when controlling for sections, there were almost statistical differences in the means for year one but not year two and similarly, when controlling for instructors, there were statistical differences in the means between instructors in year one but not year two. The results are attributed to the novice instructor, as it is clear that the novice instructor had gains in year two. Furthermore, the novice instructor reported doing a much better job teaching and embedding the learning elements in year two versus year one, which is consistent with and perhaps explains the results.

Table 6

Descriptive Statistics: Change from Pre to Post for Small Group Sections Year One

Instructor	Section	n	M	SD
B	1	38	0.394	0.449
B	2	26	0.326	0.601
B	3	30	0.239	0.403
A	4	38	0.084	0.481
C	5	29	0.168	0.403
C	6	30	0.192	0.373
B	7	32	0.144	0.462
A	8	30	0.084	0.477

Note. Instructor A is the novice instructor.

Table 7

Descriptive Statistics: Change from Pre to Post for Small Group Sections Year Two

Instructor	Section	n	M	SD
A	1	23	0.623	0.476
B	2	50	0.489	0.477
B	3	40	0.464	0.545

B	4	45	0.351	0.437
A	5	26	0.380	0.453
C	6	47	0.412	0.557
C	7	39	0.366	0.371
B	8	49	0.478	0.480

Note. Instructor A is the novice instructor.

Table 8

Descriptive Statistics: Amount Change from Pretest to Post-test Based on Instructor

Instructor	n	M	SD	Instructor	n	M	SD
	Year 1 (2018)				Year 2 (2019)		
A	68	0.084	0.476	A	92	0.446	0.459
B	126	0.280	0.482	B	184	0.447	0.483
C	59	0.180	0.385	C	86	0.391	0.480

Note. Instructor A is the novice instructor.

We were also able to control for transfer students because enrollment of one of the sections for each year consisted only of transfer students. We questioned whether the previous college experience of transfer students would impact their level of learning scores (i.e., awareness, understanding, mastery). Therefore, compiled pretest scores of transfer students were compared with sections of non-transfer students to determine if there were differences. Results revealed no differences in the pretest scores. It seems safe to conclude that transfer students' previous college experience did not impact pretest scores as scores were very similar to non-transfer students.

Because of the inability to utilize an experimental design consisting of control and experiment groups, we could not attribute causality to the changes in learning (i.e., the change in scores between post and pre) to the learning elements. However, secondary analysis conducted by sections and also instructor, along with the analysis of the transfer section seem to add credibility that the difference between pre- and post-test scores for student growth in learning can be attributed to the teaching the learning elements.

Discussion

As previously discussed, the current research project is part of a larger initiative seeking to better understand how to improve student learning and to equip students to be more effective learners.

For this current project, student learning was conceptualized into three factors: *awareness*, *understanding*, and *mastery*. Each factor represented an increase in depth of learning with *awareness* being more surface level and dependence on others; while *mastery* learning was the deepest level of learning and included a high level of student ownership. Statistical analysis established there are notable differences—or improvement—in student learning, as defined above, from the fifth week of the semester to the end of the semester. During this period, as a regular part of course content, students were explicitly taught and modeled learning dispositions and deep learning connections. As evidenced by the moderate effect size, the primary finding of this research is that student learning increased during this eleven-week period. Although exercising caution, we do conclude that teaching and embedding the learning elements as part of course content contributed to a growth in student learning.

Furthermore, results from the current study are consistent with the results from previous research projects in our initiative on student learning. For example, a pilot study was conducted in fall 2017 in the same course and employed an experimental design. The pilot also included focus groups. One section of the course was the experimental group while another section was the control group. All nine of the learning elements served as the intervention. Results, similar to the current study, revealed gains in student learning (i.e., awareness, understanding, and mastery) for the experimental group along with very positive feedback from the focus groups. The results of the pilot were so favorable that the university at which the study took place decided it was necessary to include teaching the learning elements throughout all sections of the course in subsequent years.

It is also credible to ascribe at least some of the growth in learning to teaching the learning elements because it is consistent with literature. Mayhew et al. (2016) summarize that teaching students how to learn can have a positive impact on learning outcomes. Kuh et al. report that "students who participated in a first-year course specifically designed to enhance their academic skills or social development enjoyed significant advantages over peers who did not have such an experience" (2007, p. 5). Goodwin and Hein (2016) assert in their report "The X Factor in College Success" that student success is often the product of a can-do attitude, self-discipline and study habits, and active learning. Additionally, Dweck's concept of growth mindset (2006) and Duckworth's grit (2016) are examples of dispositions that contribute to success. Literature also reports the importance of teaching learning strategies that promote deep learning, especially to first-year college students (Erickson et al., 2006). Furthermore, the results of our research are consistent with Farrington et al. (2012) in their study *Teaching Adolescents to Become Learners*, which included embedding learning instruction in classroom content.

Lastly, the differences between the instructors who had experience with the learning elements versus the instructor who did not have previous experience with the elements also seems to suggest that gains in student learning can be attributed to embedding the learning elements. We conclude this because students in the novice instructor's sections in year one (2018) had lower change scores (post minus pre compiled scores) compared to the experienced instructors; yet, in year two (2019) the change scores in the novice instructor's sections increased to comparable levels with the experienced instructors. Also, the novice instructor reported improvement in embedding and teaching the learning elements in year two versus year one.

Recommendations for Practice

At the very heart of our research is a desire to equip students to take responsibility to own their learning. Equipping students to own their learning not only increases college success but also lifelong engagement (Keeling, 2004; Kuh et al., 2010; Mayhew et al., 2016). Research suggests that one of the most effective ways to help students improve their learning is pairing a study skills course with a content course (Soven et al., 2012). Our research takes this a step further by embedding the learning strategies within the content course. Based on the outcomes of our current study along with existing findings from our research initiative, we are optimistic about including our learning elements as a part of the classroom instruction. We do acknowledge that our research is very much in a state of exploration and there is still much to learn. Consequently, with some careful caution we offer the following suggestions that we believe are most effective for teaching the learning elements and also for equipping students to become better learners.

The first step when building a learning strategies intervention is to identify which learning strategies to include. In our intervention, we emphasized strategies from two categories: those of disposition or attitude associated with deep learning and those focused on deep learning through making connections. We suggest consulting the literature to determine what makes most sense for you, your students, and your course (see Ambrose et al., 2010; Bain, 2012; Biggs & Tang, 2009; Doyle, 2011; Doyle & Zakrajsek, 2013; Kuh et al., 2010; McGuire & McGuire, 2015; McKeachie & Svinicki, 2006; Weimer, 2013).

As you consider the scope and sequence of your curriculum, you will need to identify when to teach learning strategies. Generally, learning strategies should be taught at the time that is most beneficial for student learning. Because of the nature of this research project, the learning elements were not taught until week five. We believe that it would be more helpful to introduce these earlier in the semester so that students could begin using them immediately.

Since the faculty embedded the learning elements into the curriculum, the elements were explicitly taught along with the content from the course. This included separate readings and assignments for the learning elements and the inclusion of the learning elements on exams. After the learning elements were taught, they were regularly reinforced throughout the semester by including them in conversations with students, as standalone assignments, and along with the other content from the course.

Moreover, the learning elements became a natural part of the course conversation throughout the semester. A primary reason for doing this is that shared language is a very important part of creating a culture (Kuh et al., 2010; Schein, 2010). Including a shared language was necessary for creating a supportive learning environment and continued practice of the elements (for example, simple reminders at the end of class to encourage students to continue thinking about the course throughout the day [e.g., active engagement]). Another example was allowing time for students to create their own examples of course content (e.g., application) and then share these examples with a partner during class discussions. Our intent was to have students begin to see themselves as—even identify as—intentional learners.

Limitations and Implications for Future Research

One of the limitations of this research is that all data was self-reported. Furthermore, as previously mentioned, a substantial challenge to this research is the lack of a control group. It is important that future research designs include a control group or leverage an experimental design to estimate the causal effect of including learning strategies within a content course. An evaluation should also include a study of program implementation to identify best methods for teaching students how to improve their learning.

This research should be replicated in other contexts, particularly at institutions of various types. Our research benefited by studying the experiences of two samples of students from the same course over two separate years. It also benefited from the progression of our ongoing research initiative. However, the small and homogeneous samples limit the conclusion and implications.

As previously indicated, future studies should include those designed to establish validity for our three measures of learning (awareness, understanding, and mastery) and the associated composite measure. Furthermore, utilizing grades as a measure of learning might also help to evaluate the efficacy of teaching the learning elements. Grades in courses concurrently taken with the focal study and grades in courses in the subsequent academic term constitute possible indicators of learning.

Lastly, germane to this research project, is the need to research the specific learning elements that we included in our research. We recommend isolating the learning elements to better understand how each element respectively contributes to the learning process. For example, active engagement is such an important part of the learning process—perhaps this disposition is more effective than the others (see Zull, 2004). Additionally, not only should isolating the elements be studied, but it is also equally important to study combining the learning elements in order to evaluate any interaction effects.

Conclusion

The results of this research need to be considered within the overarching *Culture of Learners* research project. The CL project has been in development for quite a few years and includes an extensive review of the literature, research, input from a variety of practitioners, and feedback from students. In light of this context, the results of the current research seem to support the benefit of teaching the learning elements within the context of a content course across the duration of a course.

Although much work needs to be done, teaching students these learning elements as a method for helping them become better learners seems to be promising. Because of our ever-changing world, including workforce and societal expectations and demands, now more than ever educational institutions have a responsibility to not only equip students to be competent in their chosen field but also to be equally competent as thinkers and learners. It is our recommendation that educators seriously consider how to include learning strategies as a part of the academic experience in order to achieve these things—not only as a means for academic success but also as a method for establishing a culture of learning among students and also for aiding lifelong learning.

A Final Thought

Learning is the fundamental building block of everything in life—from reading, writing, and arithmetic, to music, to sport, to theatre, to relationships—we are natural learners, relying on and employing a set of learning tools to help us learn. This natural approach to learning is most often evidenced in our approach to developing skills in those things that we hold with high intrinsic value. In other words, in those things we find most interesting, we have the natural tendency to use appropriate learning strategies—those strategies that are most effective for learning to occur. The challenge comes in translating these approaches to meet the needs of formal education—a model that is currently built upon efficiently educating the masses; unfortunately, traditional practices for mass education may be opposed to the natural ways we learn. What if we could identify those tools that are most effective, teach and reinforce these tools to students, and along the way equip them to be active agents in their learning? This could do wonders for students' academic success as well as equip them for the ever-changing demands of the 21st century. As we close this report, our final thought echoes the words of Goodwin and Hein (2016): "[T]he real X factor [the factor most associated with college success] may be the fact that at any point in their lives, students can change their attitudes and habits and, thus, their life outcomes."

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