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When Practitioners and Scientists Collide: An Evidence-based Activity for Management Education

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ABSTRACT

In this quasi-experimental study, our team of management educators and learning scientists tested an evidence-based learning activity designed to have students internalize the importance of empathy. 83 students enrolled in two sections of a second-year undergraduate management course completed a version of a voluntary online activity. Prior to the activity, students in one section of the course received materials highlighting the core functions of management (*planning, organizing, leading* and *controlling*). Students in the second section of the course received materials introducing the *design thinking* process.

To help students internalize the value of empathy, we incorporated design principles from cognitive, educational, and social psychology into the activity. At the end of the activity, students applied their set of resources to help a prospective student solve an ambiguous management problem. Students in the functions of management condition overwhelmingly focused on the outcome of the issue, while students in the design thinking condition were more likely to focus on the process that would lead to the outcome. Students in the design thinking condition were also significantly more likely to display evidence of cognitive empathy for the prospective student.

Keywords:

management education, design thinking, evidence-based instruction, cognitive empathy

When Practitioners and Scientists Collide: An Evidence-based Activity Design for Developing Management Competencies

There is a tension in management education classrooms between the presentation of content and the development of the softer skills informed by that content (Rubin & Dierdorff, 2009). Practitioners serve as the referees at the interface of this educational tug-of-war—believing they must prioritize one side at the expense of the other. For instance, practitioners must balance how much time should be spent introducing the four functions of management against how much time students spend investigating, testing, and applying them. They must teach business ethics and still gather a sense of whether their students will make ethically responsible decisions (Gioia, 2002).

Interestingly, developmental, educational, and social psychology have all shown it is possible to use the same activity to achieve a greater depth of knowledge in a field and develop the skills, beliefs, and identity necessary for that field (Rogoff, 2003; Dweck, 1986; Van Haneghan, Barron, Young, Williams, Vye & Bransford, 1992). In this quasi-experimental study¹, a coordinator of an undergraduate management course combined forces with two learning scientists to create a research-informed activity that could be delivered to students without sacrificing time spent on course content. As a team, we tested how applying social psychological principles to the design of an optional course activity can lead to differences in the skills students employ when completing the activity.

The single activity described in this paper stems from two movements in management education. The first movement is the incorporation of empathy into management decisions. The

¹ Our study is considered quasi-experimental because all students within a section were assigned to the same condition rather than assigned randomly.

second movement is the emphasis on evidence-based learning designs. We will summarize each movement in turn.

COGNITIVE EMPATHY

Let us begin with the generalization that transdisciplinary research—research that dissolves boundaries between traditional knowledge domains in the pursuit of solving complex problems—is not easy. There is no shortage of scholars willing to attest to how each domain has different definitions for the same terms (Wilson, 1995), different standards of evidence (Freeman, Preissle, Roulston & Pierre, 2007), and wildly different approaches to solving problems (Barrows, 1986). In our case, we ran headlong into all of these issues. However, our well-developed sense of cognitive empathy helped us persevere.

Cognitive empathy is the non-affective component of empathy (Davis, Luce & Kraus, 1994). Essentially, it is an understanding of what someone else is thinking or feeling without necessarily having to feel it yourself. When someone advises you to “put yourself in the other person’s shoes,” they are making a plea to use cognitive empathy to manage a situation. Without going into a neurological explanation, cognitive empathy allows a person to simulate another person’s thought or physiological processes. It develops over time and is thought to be fully developed by the time a person is in their mid-twenties (Greimel, Schulte-Rüther, Fink, Piefke, Herpertz-Dahlmann & Konrad, 2010). This extended time course makes cognitive empathy one of the few cognitive abilities that is still developing in most undergraduates.

From a management perspective, high levels of cognitive empathy are required for transformational leadership, human systems design, and transdisciplinary problem solving where understanding how the key stakeholders think and feel is part of understanding the problem (Kellett, Humphrey & Sleeth, 2002). Unfortunately, prior research has found little recognition for

empathy on lists of management competencies (Holt & Marques, 2012) and even less recognition for its development in the context of business school courses (Brown, Sautter, Littvay, Sautter & Bearnese, 2010). However, just because it flies under the radar, it still stealthy serves as the foundation for the modern transformation in management competencies. The ultimate question we sought to answer was whether we could get students to internalize the importance of cognitive empathy and somehow display it in an observable way.

This question brought us to the Stanford d.school's version of the design thinking process (Brown, 2008). Figure 1 shows the stages of this particular instantiation of the design thinking process.

Insert Figure 1 about here

The d.school's courses and projects are built on a process that leads with empathy. This empathy could be for other students, other people, or even other creatures. No matter who the focus is of a design solution is, it is never the designer. The important part of this first stage is to understand the needs, wants, and desires of the people you are trying to solve a problem for. This needs to happen before you formally define that problem. Successful design thinkers are able to understand people which allows them to recast problems before proceeding to ideating on solutions, prototyping the promising ideas, and eventually testing whether they work. In a management context, design thinking lends itself to transformational leadership styles where managers concern themselves with developing their workers to be better people and not just more productive employees. It can also be harnessed to inform human system design with its interconnecting layers

of complexity. With empathy development as our study's destination, design thinking as the path to there, all we needed was the vehicle to carry us there.

EVIDENCE-BASED LEARNING DESIGN

To select that vehicle, we followed the evidence and turned to two bodies of psychological literature. We began with the common assumption that academic engagement and motivation are efficient gateways to learning. We later built off the common understanding of academic engagement to incorporate features of recent social psychological activities into our activity design.

Engagement Theory

Kuh's (2003) work on academic engagement begins with a simple premise, students who are highly engaged study with greater focus and practice more often to improve their abilities than their less engaged peers. The chain of reasoning then goes from students who study and practice more often to students who learn more and retain that knowledge longer. The evidence supports this linkage, but the associations between measures of engagement and measures of learning are often very small correlations (less than .10) (Carini, Kuh, & Klein, 2006).

More useful evidence comes from learning analytics research on massive open online courses (MOOCs) and evaluations of large university learning management systems (LMS). With automated data processing, machine labeling of learner clusters, and visualization tools, researchers have evidence for what many instructors already know: 1) Student engagement wanes over the course of the semester (Kizilcec, Piech, & Schneider, 2013), but 2) instructor intervention can be the spark that ignites engagement (Gašević, Dawson & Siemens, 2015), and 3) the type of learning activities students are exposed to matters to student engagement. High-impact practices like having students engage in learning communities or complete service oriented activities boosts engagement (Brownell & Swaner, 2009). Low impact practices like traditional lectures lower it.

With this in mind, we decided to schedule the activity early in the semester to maximize engagement and focus the activity on a highly service oriented problem that bridged where students once were to where they were at that moment—making education better for incoming students. However, we were still unsure about how to deliver the activity and whether to make it compulsory or optional. Common perception among instructors in the business school is students only complete compulsory assignments with a non-trivial grade percentage attached to them, and they only try when points really matter. While none of us had ever seen data supporting this common perception, we had seen data supporting the power of social psychological activities.

Social psychological activities

Much like cognitive-behavioral therapy, social psychological activity theory is predicated on making the subject do cognitive work in preparation for future challenges and social pressures (Walton & Cohen, 2011). The difference is social psychological activities do not require licensed therapists or months of sessions to make progress. In fact, a number of social psychological activities have had large effect with single sessions lasting less than an hour.

The working hypothesis for why social psychological activities are effective at behavioral change is because the subject must expend mental effort constructing new decision pathways to complete a task, that effort then inoculates them against challenges and helps them maintain a stable mind-set (Walton, 2014). Social-psychological activities have been developed to improve marriage quality (Finkel, Slotter, Luchies, Walton, & Gross, 2013) by having subjects write undelivered letters to their spouses, responses to a cancer diagnosis (Meyer & Mark, 1995) by writing about positive events, and inter-racial perceptions (Aronson, Fried & Good, 2002) by thinking of positive examples that contradict racial stereotypes. They have even been found to

increase undergraduate retention rates of at-risk students (Cohen, Garcia, Apfel & Master, 2006) with just a short intervention linking deliberate learning to cellular growth in the brain.

We used the principles of social psychological interventions to inform the design of our management competency learning activity. We extracted three design principles from the social psychological activities we reviewed: 1) make the students work at a novel and somewhat ambiguous task, and 2) make that task meaningful to the subject, 3) measure the psychological changes due to the activities. In classroom settings, we call psychological changes “learning outcomes.”

HYPOTHESES

With all of the pieces in place to develop a learning activity capable of developing cognitive empathy, we devised a set of four hypotheses that addressed perceptions instructors have of students in general and the efficacy of our activity design specifically.

Hypothesis 1: Students are unlikely to complete a voluntary course activity that is only tangentially related to the course content.

Hypothesis 2: Of the students who complete the voluntary activity, they will use the terms introduced in their version of the voluntary course activity when asked to solve a problem based on those resources.

Hypothesis 3: Students receiving a set of resources that highlight the importance of the process of solving a problem, instead of the importance of the outcomes of solving a problem, will focus more on the process of solving a complex problem than the actual outcomes.

Hypothesis 4: Students receiving resources on the design thinking process will be more likely to empathize with the problem’s key stakeholder.

METHODS

Participants

83 undergraduate students enrolled in a business management course voluntarily consented to making their course activity data and assignments available for analysis. 47 of the students were female, and 36 were male. 61 of the participants were in their second year of university studies. The remainder were in either their third or fourth year of university studies. The students came from two course sections of a larger cohort. The same instructor facilitated both sections.

Materials

Learning Activity Management System (LAMS) sequences. With guidance from the course instructor, we used the LAMS platform to assemble two sets of learning sequences. LAMS enables learning designers and course developers to sequence the presentation of online materials and host learning activities like quizzes, written assignments, and collaborative activities for students to complete (Ghiglione & Dalziel, 2007). The platform interfaces with the campus' learning management infrastructure so the outcomes of the individual LAMS activities can be recorded in the course's online gradebook.

Although the two themes of the resources and materials differed slightly, our two activity sequences proceeded through the same presentation structure: 1) an overview of the module and what students were expected to do while completing the sequence, 2) two animated videos followed by a transcript of an interview related to the sequence's theme, 3) a summary of recent psychological studies related to decision-making processes, and 4) a short writing activity asking students to apply what they learned from the resources. Figure 2 and Figure 3 show the structure of the functions of management and design thinking LAMS sequences respectively.

Insert Figure 2 about here

Insert Figure 3 about here

With regard to the themes themselves, the resources and materials within the sequences highlighted either design thinking stages or business management functions. The design thinking sequence focused on the steps of Stanford's d.school design thinking process (Brown, 2008) and explicitly referenced the importance of cognitive empathy for understanding people and solving problems. The management functions sequence presented students with the four functions of management based on Fayol's (1949) model and an abridged interview with Henry Mintzberg (1994) on the qualities of good managers. While the concepts explained in the design thinking materials were new to the students, the concepts in the management material were actually a review of concepts introduced earlier in the semester.

LAMS writing activity. For the final component of both LAMS sequences, students read a short scenario embedded within a letter from a prospective university student. In the scenario, a high school student explains that she has been tasked with providing input into the formation of a committee to imagine the *Future of Learning* in higher education. The scenario states that the committee must to be composed of high school students from across the district and needed to meet weekly for six months. At the end of the six months, the committee will present its vision to university and education leaders. At the end of the scenario, the prospective student asks for advice on how to approach the situation. The activity then specifies that students should use the resources

found in their LAMS sequence to write a short letter of at least two to three paragraphs to the prospective student in response to her query. Students entered their response to the scenario into a text box below the scenario description.

As not to unintentionally prime students toward a particular response, none of the design thinking and the functions of management terms explained in the resources were used in the scenario's description. We also intentionally left the focus of the advice and how to structure it undefined. Students completed the entire activity sequence on their own time outside of class.

Course materials and lectures. Students in each section met once a week for the scheduled class session with the instructor. Each session ran for four hours. During class time, the instructor led students through a mix of lecture slides, discussion activities, and case studies. Both sections followed the same syllabus, covered the same course materials in the same sequence, conducted the same in-class activities, and used the same lecture slides presented by the same lecturer. By the time of the activity, the lectures had presented students with an overview of the four functions of management and provided opportunities for in-depth discussions about planning and organizing.

Procedures

During the fourth week of the semester, the instructor for the two course sections made a version of the LAMS module available to his students through the course's online learning management system. The instructor helped develop the content and structure of both LAMS sequences, but was blind to which sequence was provided to each of his sections. Each version of the sequence presented a slightly different set of resources. In one condition, students received content emphasizing the functions of management, project management, and decision-making. In

the second condition, students received content emphasizing design thinking, empathy, and decision-making. Table 1 contrasts the differences between each condition.

Insert Table 1 about here

Prior to the activity's release, the instructor briefed the students in each section about the activity at the end of their respective class periods. He emphasized that the activity was voluntary and would not be directly graded, but it was nonetheless important to the course's learning outcomes and objectives. The activity remained active for one week.

During the following class session, and after the activity's completion window closed, the instructor introduced two researchers to his sections. The researchers did not have any prior connections to the course. In accordance with the university's institutional review board's policies regarding voluntary consent, the instructor left the room as the researchers distributed information packets to every student in attendance. The packets included a description of the research study, a consent form requesting access to students' activity data and course assignments, and a learner profile questionnaire. In addition to the written descriptions, the researchers verbally informed the students about the nature of the study. The researchers explicitly mentioned that participating in the study was voluntary, and participation in the study would neither positively nor negatively affect participants' grades. The researchers also emphasized that the instructor would not be privy to the individual data and results collected by the researchers. Students then chose whether to provide or withhold consent. Students who provided consent subsequently filled out a questionnaire focusing on their expected level of academic engagement of the remainder of the semester, the quality of their learning, and their propensity for perspective taking. The answer

choices for each item were presented as a four point, unidirectional Likert scale. Only the demographic data and expected workload measure collected by the survey will be discussed in the context of this paper.

Students who chose not to participate in the study were given the option of taking a short recess or remaining quietly at their seats. After all of the participating students had an opportunity to fill out the consent form and complete the survey, the researchers collected the packets and released students for a short recess.

Throughout the study briefing and survey completion, the instructor remained outside of the room as not to unintentionally coerce students into participating in the research. After the end of the semester and the instructor had submitted the final course grades, the researchers proceeded with exporting an archive of the LAMS activities for the consenting students.

Measures and reliability

We coded the LAMS writing activity according to five variables, 1) whether a response was submitted, 2) how many of the introduced management terms the activity included, 3) how many of the six introduced design thinking terms the activity included, 4) what the focus of the advice was, and 5) whether the student empathized with the prospective student featured in the activity.

We used a binary coding scheme to indicate whether a participant completed the LAMS sequence. For the management and design thinking terms, we created categories for each of the core management functions and design thinking stages. While reading each response, a researcher assigned a binary value to each category based on the presence or absence of the given concepts. The management terms included planning, organizing, leading, controlling, and goal setting. The design thinking terms included empathizing, defining, ideating, prototyping, and testing, along

with design thinking itself. Students received credit for using a concept even if they only mentioned the term. Students did not have to apply the term to their solution or explain its meaning. After the initial coding of the writings, we totaled the scores for the management terms into a single variable ranging from zero to five. We calculated the total for the design thinking terms the same way into a variable ranging from zero to six.

We also coded the LAMS writing activity for the presence or absence of cognitive empathy toward the prospective student. As an example, a student could show cognitive empathy for the prospective student in the LAMS writing activity by recognizing that the prospective student may not have had experience organizing diverse groups of individuals and explained the procedure for how to set a meeting, book a room, and organize people.

We also coded the type of focus students showed when responding to the prospective student. We identified four levels of focus related to process orientation: 1) the student opted out of the activity by either not submitting a response or attempting the activity, 2) the student did not provide an obvious focus, 3) the student focused on the scenario's outcome (the presentation), 4) the student focused on the process (forming a committee). For responses judged not to have a focus, students merely summarized the content of the resources and did not address the prospective student. Outcome focused responses emphasized the presentation the committee had to give at the end of the six months. When focusing on the process, students explained how or what the prospective student should consider when setting up the committee that was responsible for developing the presentation.

For all of the qualitative measures of level of focus and the presence of empathy, a second coder was used to provide a calculation of interrater reliability. As with the first coder, the second coder was blind to condition. With respect to identifying the set of management and design

thinking terms, a custom automated text analysis tool was used in lieu of a second coder. The average Cohen's κ for all measures was .81 and the kappa value for every measure exceeded .74 and reached significance at the .05 level, indicating a good level of inter-rater reliability.

RESULTS

More than 92% percent of the students enrolled in the two course sections agreed to participate in the study. Before analyzing the data to answer the three hypotheses, we conducted a multiple analysis of variance (MANOVA) to determine whether gender, year in school, or academic expectations differed by section. Table 2 shows the results of the analyses. None of the analyses were found to be significant, so we proceeded under the assumption that the samples found within the two sections were equivalent.

Insert Table 2 about here

Assignment completion by condition. Overall, 76% of consenting students completed the writing activity. A one-sample t-test indicated this percentage was significantly different from zero.² When looking at condition differences, 68% of the students assigned to the design thinking condition and 83% of the students in the management condition completed the writing activity. However, a Chi-square analysis indicated that this difference was not statistically significant.³

Use of management and design thinking terms by condition. We conducted a MANOVA using the LAMS sequence condition as the independent variable and the number of

² $t(82) = 16.02, p < .001$

³ $X^2(2, N = 83) = 2.57, p > .10$

used management terms and design thinking terms as dependent variables. The analysis identified a main effect of condition for both measures. We identified a main effect of condition with respect to used management terms⁴ and a main effect of condition with respect to used design thinking terms.⁵ As Figure 4 shows, the greater use of terms matched the condition assignment with management terms used more often after progressing through the management sequence and design thinking terms used more often after progressing through the design thinking sequence. writing activity.

Insert Figure 4 about here

In short, they used the terms from the sequence in the LAMS

Assignment solution by condition. We conducted a one-way analysis of variance (ANOVA). The analysis indicated a significant main effect of condition at the .01 level.⁶ As Figure 5 shows, more than 75% of students who completed the management sequence focused on the scenario's outcome (the presentation).

Insert Figure 5 about here

⁴ $F(1, 61) = 89.24, p < .001$

⁵ $F(1, 61) = 29.26, p < .001$

⁶ $F(1, 82) = 7.41, p < .01$

In contrast, students completing the design thinking sequence showed a wider distribution of focuses. They also focused much more on constructing the committee than students in the management condition did.

Presence of empathy by condition. We found 18% of students who submitted a non-empty response in the design thinking condition showed indications of cognitive empathy. In contrast, only 3% (one student) showed signs of cognitive empathy in the management condition. We conducted a Chi-square test to determine whether the difference in the percentage of students showing empathy in the design thinking condition differed from the percentage of students showing empathy in the management condition. The results showed a significant difference in the expression of empathy between conditions.⁷ Calculating Cohen's *d* based on these percentages and associated standard deviations revealed an effect size of .50 in favor of the design thinking condition.

DISCUSSION

In this section, we shall revisit each of the hypotheses in turn.

Hypothesis 1 – Students opt out of optional activities

We posited Hypothesis 1 to counter the perception held by many instructors that when students see the word “optional” they tend to “opt out” of the activity. As our results show, when provided with a novel opportunity to showcase what they have learned, an overwhelming majority of the students in the two sections seized it. While this study was not designed to test which features of the activity actually drew students in and engaged them, as previously mentioned, we did design the activity in accordance with common design principles for increasing and harnessing

⁷ $X^2(2, N = 63) = 4.01, p < .05$

engagement by offering it early in the semester, using a variety of materials, and making the writing activity personally meaningful to students.

Hypothesis 2 – Students will not apply the material provided in an optional activity to the activity itself

We originally posited this hypothesis as a manipulation check to make sure that students were addressing the concepts found in the sequence. However, during the study, we realized it is one thing to show students will complete a learning activity. It is another thing to show students actually applied what they learned during the activity to the assessment of the learning activity. One worry among instructors is students “go through the motions” when completing ungraded assignments because there is nothing at stake. In our own experiences consulting with instructors, we have encountered instructors devising schemes to award fractions of points to assignments just to ensure students generate “meaningful” responses. We took a different approach and worked to ensure the design of the activity was inherently meaningful to students by casting the protagonist of the activity’s scenario as someone students could readily identify with—a capable student tasked with completing an ambiguous task for the benefit of others like themselves.

The design decisions seem to have worked. As indicated by the use of the introduced terms, students did use sequence specific terms when advising the prospective student on how to solve her problem. While it is heartening to know students took the time to review the materials and apply them to a novel problem, in another sense, it is troubling that when students are asked to “apply what they have learned” they gravitate toward mentioning the key terms they have been recently introduced to—even if the situation does not call for it. Essentially, the use of design thinking and management terms were measures of students’ ability to comprehend and recall recent information rather than apply the meaning behind those terms. That 95% of students used

the terms from their respective conditions implies that students interpreted “apply” as actually meaning “summarize and/or correctly use.”

Hypothesis 3 – Condition effects on categories of focus

With verification that students in both conditions were essentially equivalent, attempted the activity and provided meaningful submissions, we will now discuss the interesting differences between the two conditions. That twice as many students in the management condition would focus on the outcome presented in the scenario as the students in the design thinking condition surprised even us. This finding does bolster the theory that outcome-focused processes and frameworks prime learners to shortcut the lengthier and more ambiguous design and development processes. Giving recommendations for how to plan, organize, and execute a presentation is much more straightforward than designing a process to assemble a committee that is capable of reaching that outcome on its own.

At the same time, we are somewhat concerned with the results from the design thinking condition. Students in this condition were more likely to focus on the construction of the committee than their peers in the management condition, which supports introducing students to design thinking processes to develop their holistic reasoning abilities. However, regardless of what the Chi-square analysis indicates, students in the design thinking condition were also less likely to attempt the writing component. If we were to scale the activity across all of the sections of the course, having four times as many students focus on the process might not be worth losing twice as many students to opting out of the activity.

In future iterations of the activity, providing more instructor support for students as they reason about complex problems with ambiguous constraints than merely pointing them to resources appears to be in order. In the nearer term, we will analyze the learning profiles of students

who opted out of the activity versus those that completed it and try to identify what cognitive blocks are preventing some students from engaging with the activity.

Hypothesis 4 – Condition effects on the presence of cognitive empathy

Finally, our analyses support the hypothesis that the particular design thinking process that emphasizes empathy would induce students to display cognitive empathy in their advice. Unfortunately, due to the limitations of the study, we cannot conclude whether the design thinking sequence facilitated cognitive empathy or whether the functions of management sequence suppressed it. Our study does not have a control condition on which to base such a conclusion.

Still, as far as providing an easy-to-execute activity for students to display complex problem solving and cognitive empathy in a management context, our activity must be considered a success. Students in the design thinking condition were more likely to identify the potential feelings of the prospective student and take them into consideration as they offered management advice. We understand these results are predicated on a few students exhibiting empathy where a few others did not. However, whether the effect was due to the activity sequence or the instructor inadvertently mentioning something different to one section of his class, knowing that nearly 20% of students are capable of relating to someone else when the situation arises is much better than not knowing. We also believe it is much better than knowing 95% of advanced business students can successfully interpret video and text resources well enough to summarize them for someone else—a sequence of tasks we assume they mastered years earlier.

Conclusions

Overall, our results show that introducing a short activity introducing design thinking that highlights the value of empathizing with others leads is a viable alternative to sacrificing course content in favor of developing softer management competencies. Not only are students willing to

complete optional assignments that are designed with the principles of academic engagement in mind, students are also willing to produce meaningful and nuanced responses to management problems that consider the needs, thoughts, and feelings of stakeholders when needed.

Our next steps will be to scale our activity beyond a single instructor and randomly assign students within sections to either the management or design thinking questions. This follow-up study will eliminate the confounding variables associated with within section designs. We also plan on investigating individual learning profiles to better understand what influences some students to exhibit empathy when others do not. Finally, we will look at the more distal impacts of our activity sequences. Right now, we know the sequences have immediate effects on the subsequent writing task. It remains unclear whether these near-term impacts continue to manifest themselves in later writing activities.

In summary, there is much work to be done to transition traditional business courses toward helping their students meet the needs of a rapidly changing world. However, if business instructors and course coordinators are prepared to move beyond using sanitized case studies that highlight a limited set of core business principles and small group discussions that inadvertently coax students to match course terms to decontextualized questions, adding a modicum of emphasis on humanistic design principles and processes to the curriculum may be a way forward. Our data suggests undergraduate students are prepared to deliver on the promise of more holistic decision-making and management solutions if the situation warrants it. All we have to do is let them volunteer to do it themselves.

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TABLE 1**LAMS Sequence Resource Descriptions by Condition**

Resource	Condition	
	<i>Principles of Management</i>	<i>Design Thinking</i>
Video 1	Introduction to the principles of management	Introduction to empathy
Video 2	Introduction to project management	Introduction to design thinking
Reading 1	Interview with Henry Mintzberg on the qualities of a good manager	Interview with CEOs on design thinking's application to management
Reading 2	Summary of recent psychological findings relevant to business decision making	

TABLE 2**Means Comparison of Demographic Measures between Conditions**

Variable	Management (SD) (N=41)	Design thinking (SD) (N=42)	F ratio	Sig.
Gender	0.52 (.51)	0.61 (.49)	0.61	0.44
Year	2.33 (.69)	2.27 (.45)	0.26	0.61
Residency	1.31 (.68)	1.27 (.63)	0.08	0.78
Class Preparation	2.26 (.77)	2.41 (.67)	0.93	0.34
Completed activity	0.83 (.38)	0.68 (.47)	2.58	0.11

TABLE 3**Means Comparison of Used Terms between Conditions**

Variable	Management (SD) (N=35)	Design thinking (SD) (N=28)	F ratio	Sig.
Management terms	3.11 (1.10)	0.71 (0.85)	83.52	0.01
Design thinking terms	0.49 (0.61)	1.86 (1.58)	19.23	0.01

FIGURE 1

Stanford d.school's Stages of Design Thinking (Stanford d.school, 2012)

FIGURE 2

Functions of Management LAMS sequence

FIGURE 3

Design thinking LAMS sequence

FIGURE 4

Use of Terms by Condition

FIGURE 5

Focus of Advice by Condition