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PAM: COOKING UP A MODEL THAT ENCOURAGES FACULTY TO STICK TO ACTIVE LEARNING PEDAGOGIES

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Abstract:

This study proposes PAM—a model that tests the specific factors that predict faculty's intention to adopt active learning pedagogies. The study adapts the technology acceptance model (TAM) to better understand the factors that might affect a faculty member's intention to adoption new technology. The results largely support the model. For external factors, the percentage of time lecturing was significantly related to perceived ease of adoption and social influence. Instructor perceptions of the usefulness of the pedagogy significantly predicted instructor's pedagogical attitude. Finally, pedagogical attitude significantly predicted the instructor's intention to adopt a pedagogy. These results suggest that a TAM-based model is useful for understanding faculty adoption behaviors.

Keywords: pedagogy, active learning, adoption

I. INTRODUCTION

In our daily interactions with professionals, we make a number of assumptions:

- Dentists know how to stop a tooth from hurting
- Doctors know how to stitch up a wound.
- Lawyers know how to defend people in court.
- Engineers know how to design bridges.

The public knows that the above professions require significant amounts of expertise and training—perhaps as the result of prolonged internships or residencies. They often require certifications or passing stringent examinations to demonstrate expertise.

One highly educated profession, however, continues to practice without any expertise, training, or certification. They have no knowledge of the theory or practice in their discipline, but continue to act as though they do. For that reason, the following assumption continues to haunt academia: College faculty know how to teach. In a succinct commentary on academia's view of teaching, the former president of Harvard University stated, "In the eyes of most faculty members in research universities, teaching is an art that is either too simple to require formal presentation, too personal to be taught to others, or too innate to be conveyed to anyone lacking the necessary gift" [Bok, 2006, p. 314].

Even though consumers would never visit a doctor who has had no medical training, parents continue to pay colleges and universities high costs for untrained faculty to educate their children. The tide may be turning, however. The value of a college education is experiencing unprecedented scrutiny, as parents are increasingly questioning the high cost of a postsecondary education [Carey, 2016; Harker, 2014; Archibald & Feldman, 2011]. Fewer than half of recent college graduates think the cost of college was worth the cost, and overall college enrollments are declining [Great Jobs, Great Lives, 2015; Harker, 2014].

Perhaps partially in response to this unwanted attention, universities are encouraging faculty to use pedagogies (e.g., problem-based learning, project-based learning, and team-based learning) that are more effective than traditional lecture. In spite of this encouragement and the overwhelming research favoring active learning approaches, the lecture paradigm continues to dominate colleges and universities: "Educational research over the past twenty-five years has established beyond a doubt a simple fact: What is transmitted to students through lecturing is simply not retained for any significant length of time" [Finkel, 2000, p. 3].

Even though the consensus is that lecture does not work and active learning approaches are more effective [Bonwell & Eison, 1991; Prince, 2004], institutions of higher education find shifting faculty from the lecture paradigm extremely challenging:

Scientific teaching involves active learning strategies to engage students in the process of science and teaching methods that have been systematically tested...Given the widespread agreement, it may seem surprising that change has not progressed rapidly...So why do outstanding scientists who demand rigorous proof for scientific assertions in their research continue to use and, indeed, defend...teaching methods that are not the most effective? [Handelsman, et al., 2004, p. 521].

Since the 1980s, studies have consistently found that eighty to ninety-six percent of university class time is dedicated to passive learning approaches, such as lecture [Barnes, 1983; Davis & Arend, 2013; Fritschner, 2000; Nunn, 1996; Thielens, April 1987]. In a study that examined 350 upper- and lower-level division undergraduate meetings, only nine percent of students made two or more comments during class [Fritschner, 2000]. Perhaps even more disturbing, the instructors set the bar extremely low, defining "student participation" as "showing up for class, keeping up with the reading, and paying attention" [Fritschner, 2000, p. 354]. Although some progress has been made, the reality is that the lecture paradigm is alive and well in higher education [Davis & Arend, 2013].

In light of the increased scrutiny on the effectiveness of college teaching, surprisingly little empirical research has been conducted to determine the specific factors that encourage faculty to overcome considerable hurdles and adopt active learning pedagogies. This article therefore proposes the pedagogical adoption model (PAM), a model that is grounded in the technology acceptance model (TAM), a well-tested and widely utilized model that explains why people choose to adoption technology. The goal of this study is for universities to better understand how to encourage faculty to move away from ineffective techniques and toward pedagogies that promise strong and deeper student learning.

II. LITERATURE REVIEW

A major hindrance in encouraging faculty to shift their teaching approach is that they perceive strong barriers to change [Carey, 2016; Harker, 2014; Zemsky, 2013]. Faculty are often concerned with the considerable amount of time required to understand, plan, and implement a new pedagogy, especially given the lack of rewards or recognition by their institution. Given a tenure-focused culture and a paradigm of academic freedom (which gives wide latitude to faculty on teaching strategy), administration has little leverage to compel or even encourage the adoption of active learning approaches that can improve student learning.

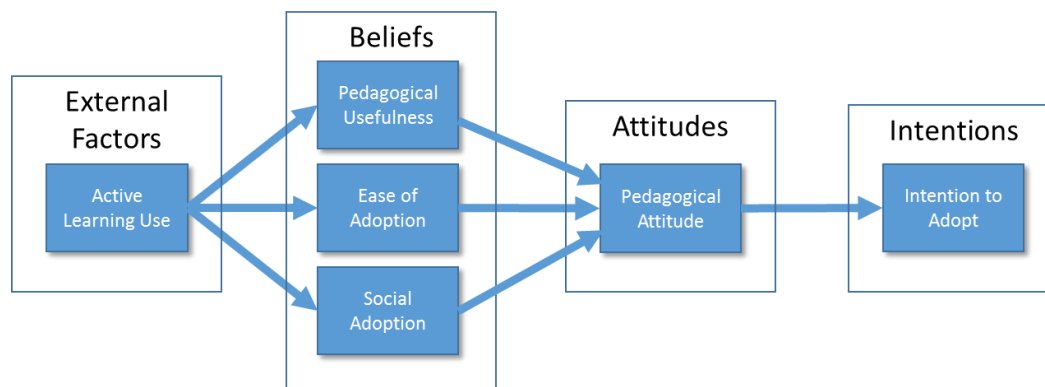
Given the significant hurdles for adopting a pedagogy, why do some faculty still adopt innovative pedagogies into their classes? One key factor may be the level of intrinsic motivation among the potential adopters. Previous research has defined motivation as the reason a person selects one action over another with great energization or frequency [Bargh, Gollwitzer, & Oettingen, 2010]. In one study of over four hundred faculty, researchers uncovered a number of key themes that characterized successful service learning adoption [Hou & Wilder, 2015]. Themes included a genuine desire to provide students realistic work experience, the desire to give back to the community, and the opportunity to see students succeed and gain self-confidence through real-life experiences. This study suggests, therefore, that to encourage voluntary change, researchers must target models that nurture intrinsic motivation. It also suggests that extrinsic motivation strategies (e.g., providing release time, paying faculty) may be a less effective approach to encourage faculty to adopt a new teaching strategy.

This study works to identify the specific factors that encourage faculty to adopt active learning approaches. A conceptual model for the research is illustrated in Figure 1. The research questions pursued in this study, therefore are:

- What factors predict a college faculty member's intention to adopt an active learning pedagogy?
- What factors result in a college faculty member forming a positive attitude about a new pedagogy?

- What factors affect a college faculty member's beliefs about a pedagogy?

FIGURE 1: CONCEPTUAL MODEL



All proposed relationships are positive.

The Technology Acceptance Model (TAM) as a Theoretical Lens

The proposed model relies on the technology acceptance model (TAM) [Davis F. , 1989], along with its succeeding refinements [Venkatesh & Davis, 2000; Venkatesh, Morris, Davis, & Davis, 2003]. TAM has provided significant insight into why users choose to voluntarily adopt a new technology. “Adoption” within the context of technology has been defined as the decision of an individual to make use of an innovation as the best course of action available [Rogers, 2003]. It is notable that this definition is not specific to technology, however, and could also apply to the conscious decision to innovate by introducing a new pedagogical approach. The idea of “innovation” may therefore be a common thread that connects technology and pedagogical adoption of active learning. In addition, adoption of a new pedagogy—similar to the adoption of technology in a business—is often encouraged by the organization, but ultimately is voluntary. Technology adoption can involve degrees of acceptance and commitment [Burton-Jones & Straub, D., 2006; Thatcher, McKnight, Baker, Arsal, & Roberts, 2011]: in a similar manner, faculty may choose to continue to lecture, but also insert active learning strategies in a minimal way to mitigate risk. Finally, both academics and employees are usually not rewarded for adoption: instead, it is often simply seen as part of their job.

The idea that pedagogical adoption may be similar to technological adoption is an important insight, because—although empirical work on pedagogical adoption is limited—technological adoption has been extensively studied and confirmed. TAM posits that a user’s perceived ease of use of a technology and the usefulness of a technology drives the user’s attitudes about adopting a technology [Davis 1989]. The effects of social influence beliefs (also called subjective norm) was later added in an extended model (TAM2) to reflect the importance of social acceptance and pressure on one’s decision to adopt a technology [Venkatesh & Davis, 2000]. One’s attitude about the technology is then the main predictor of one’s intention to use the technology. In an interesting theoretical parallel to TAM2, one model of intrinsic motivation [Ambrose, Bridges, DiPietro, Lovett, & Norman, 2010] predicts that motivating students requires that they see value in the action, that they feel the relevant others will be supportive of the action, and that students believe they have the capacity to perform the action. These three factors align closely with the TAM2 (for simplicity, henceforth simply referred to as “TAM”) factors: perceived usefulness, subjective norm, and perceived ease of use.

The above parallels therefore suggest that TAM’s efficacy as a model for understanding technology adoption may also help capture faculty’s beliefs and attitudes about pedagogical adoption, and therefore provide insight into faculty members’ ultimate intention to adopt a new pedagogy. Similar to TAM, PAM posits that the important beliefs driving an ultimate intention to adopt are the ease of pedagogical adoption, usefulness of the pedagogy, and social influence regarding adoption of a new pedagogy. Social influence may be an important addition—since even when adoption is considered to be voluntary—peers and administration may bring social pressure to change. The mediating pedagogical attitude represents the

teachers' evaluative stance—that is, whether or not they perceive that adoption is a good or bad decision. Consistent with TAM, PAM models pedagogical attitude as affecting the individual's intention to adopt the pedagogy.

Hypotheses

Although the traditional starting point for TAM is beliefs, the foundational theory of reasoned action (TRA) also includes external variables (as a basis for those foundational beliefs. For example, an analyst who sees a colleague use data visualization in an innovative way may then form the belief “if I use the same software, the effectiveness of my lectures will improve.”

For that reason, the researcher examined the percentage of time faculty use active learning approaches as an external variable that might influence faculty's foundational beliefs. Because beliefs reflect one's perceptions about engaging in a behavior [Ajzen & Fishbein, 1980], the extent that someone engages in that behavior should provide important inputs into their foundational beliefs, which may be a factor in their subsequent formation of attitudes about the pedagogy. Faculty who use PBL and related pedagogies are more likely to rely on and be comfortable with an active learning approach. This reliance is likely to result in a greater belief that active learning pedagogies will be easier to implement. The comfort level with active learning is also more likely to result in the perception that active learning approaches are more useful, since cognitive dissonance would suggest that teachers have confidence in the approaches that they regularly use [Festinger, 1957]:

H1a: The amount of time faculty use active learning will be positively related to the perceived ease of adoption of active learning pedagogies.

H1b: The amount of time faculty use active learning will be positively related to the perceived usefulness of active learning pedagogies.

When formulating the hypotheses, the researcher felt that the effects of social influence would largely depend on the pervasive culture. Before administering the survey, therefore, the researcher conducted a number of videoconferencing calls with a faculty member at UNIFEI (*Universidade Federal de Itajubá*), which is the location for the data collection. Once the researcher arrived at UNIFEI, he also met with the university's director. A main purpose was to better understand the predominant culture at the institution. The researcher found agreement between the UNIFEI faculty member and director that UNIFEI is dedicated to ensuring the faculty's academic freedom. They also believe that faculty should select the teaching approach with which they are most comfortable.

Based on these interviews, the researcher *a priori* formulated the hypotheses and the resulting survey instrument. The researcher initially felt that the relationship between the percentage of time using active learning and social influence would likely be negative: he assumed that the more faculty members used active learning, the less pressure they would feel to use active learning. The interviews, however, contradicted this view. The interviews strongly suggested that faculty utilizing active learning wanted to use it *even more*. In contrast, the dedicated lecturers communicated that they felt no pressure to change.

This new information suggested that cognitive consistency theories (e.g., Festinger, 1957) were in play. Faculty who use lecture will be confident that they are utilizing the best approach: they are likely, therefore, to place little weight on the perceptions and pressures of others. Hence, lecturers should believe that their faculty-centered approach is an effective approach for student learning, and—given the interviews with UNIFEI faculty and administration—not feel pressured or threatened to change:

H1c: The amount of time faculty use active learning will be positively related to the amount of social influence to use active learning pedagogies.

The use of TAM as a theoretical basis provides guidance for the potential relationships between beliefs and attitudes in the proposed PAM model. PAM posits that beliefs about adopting a pedagogy will affect attitudes toward active learning pedagogies. Attitudes in general reflect an evaluative stance toward particular action; within this study's context, therefore, pedagogical attitude reflects a predominant positive or negative stance toward adopting active learning approaches. Faculty who perceive that active learning

pedagogies are easy to adopt and are useful in their job are likely to develop positive affect toward the pedagogy. Moreover, faculty who perceive increased interest among their significant others (e.g., their colleagues and administration) are also more likely to consider the relative merits of involving students more in class. The effects of social influence, therefore, are likely to result in increased positive affect and a willingness to explore alternative methods of teaching. The resulting positive affect from perceived ease of adoption, usefulness, and social influence should result in a positive evaluative stance (i.e., adoption is a good idea) toward adopting the pedagogy:

H2a: The perceived ease of adoption will be positively related to one's pedagogical attitude.

H2b: The perceived usefulness of a pedagogy will be positively related to one's pedagogical attitude.

H2c: The perceived social influence to adopt a pedagogy will be positively related to one's pedagogical attitude.

The progression of beliefs, attitudes, and intentions provides a directive flow and insight into the chances one will perform a specific behavior [Ajzen & Fishbein, 1980]. Although one's attitude toward an action reflects commitment to a valence regarding the potential behavior ("I like problem-based learning"), the movement to an intention represents a shift from simple affect to a volitional tendency to perform a specific behavior in the near future. This shift captures the movement from passive acceptance of the risks of acting to an internal willingness to act, despite the risks. Using this logic, the following hypothesis is consistent with TAM:

H3: Faculty's attitude toward active learning pedagogies will be positively related to faculty's intention to adoption active learning pedagogies.

TRA is a parsimonious approach for understanding the complex process of how beliefs about an action will ultimately affect one's intentions to take the action. Although the valence of one's beliefs will likely agree with one's attitudes, the interaction and subsequent aggregation is likely complex and—in some cases—the result of a combination of contrasting and even conflicting beliefs [Festinger, 1957]. A faculty member may perceive—for example, that a pedagogy is useful, but also that it will be difficult to adopt. How are these conflicting beliefs resolved? It is the overall resulting *attitude* that reflects the resolution of the dissonance resulting from the conflicting beliefs. The attitude's evaluative stance ultimately determines whether or not the actor intends to take action. The expectation, therefore, is there will be no direct relationship between beliefs and intentions: instead, any relationship between beliefs and intentions will be contingent on the resulting attitude:

H4: Faculty's attitude toward active learning pedagogies will mediate the relationships between perceived ease of adoption, the perceived usefulness of the pedagogy, and the faculty's intention to adopt active learning pedagogies.

III. METHODS

Data were collected in summer 2016 in Itabira, Brazil at the UNIFEI campus as part of a grant that provided faculty development workshops in active learning approaches. Itabira is located in the rural Brazilian state of Minas Gerais. The visit provided a unique opportunity in that the campus was fairly new, the number of faculty were fairly small (around 200), and all were being encouraged to adopt active learning approaches for teaching. Out of the thirty-seven participants, seventeen were women and twenty were men. Faculty reported an average of approximately eight years teaching experience.

Reliability and Validity of the Measures

To determine the extent of active learning use during class, the faculty reported the percentage of time using active learning. The average reported lecture time was 32%. The minimum amount of time dedicated to lecture was 0%; the maximum was 80%. The reported percentages reflect considerable variation in the teaching methods used. These results indicate that while some faculty are aware of active learning

pedagogies (and use them in their classes), on average they represent a relatively small portion of their teaching practice.

The pedagogical belief measures were taken from previous technology adoption research [Chen, Gillenson, & Sherrell, 2002] and modified to reflect the new context of pedagogy adoption (see Appendix for all questions). The measures included perceived ease of adoption (Cronbach's $\alpha=0.84$), perceived usefulness ($\alpha=0.83$), and social influence ($\alpha=0.80$). The attitude measure included pedagogical attitude ($\alpha=0.88$) [Chau & Lai, 2003; Stylianou & Robbins, 2003]. The intent to adopt measure ($\alpha=0.91$) was also adapted from previous research [Pavlou, 2003; Suh & Han, 2002; Gefen, 2002], and were also modified to reflect the context of adopting a new pedagogy.

To confirm discriminant validity, a series of factor analyses were conducted. All used Varimax rotation, and the analysis was forced to extract the number of constructs as predicted by theory. The first factor analysis included the indicators for ease of adoption, usefulness and social influence. All expected loadings exceeded 0.80, with the exception of the third perceived usefulness indicator, which was 0.52. All cross-loading factors were less than 0.30. A subsequent factor analysis with attitude and intent also loaded as expected, with strong factors (minimum was 0.77) and low cross-loading factors (maximum was 0.43).

Convergent validity was determined by calculating the average variance explained (AVE), which represents the average amount of variance captured by a construct's indicators. In general, an AVE of 0.50 or higher is considered to be acceptable, since at least half of the construct's possible variance is captured by its indicators [Fornell & Larcker, 1981]. All AVE values were greater than 0.50. The pedagogical beliefs were acceptable for perceived usefulness (0.67), perceived ease of adoption (0.65), and social influence (0.65). The pedagogical attitude construct was also acceptable (0.75). The intention to adopt measure was also acceptable at 0.65. Adding support for discriminant validity, the square root of the AVE for each construct exceeded the correlations between that construct and all other constructs.

Based on the above analysis, construct level variables were created by taking the average indicator values. The descriptive statistics for the constructs are listed in Table 1.

TABLE 1: DESCRIPTIVE STATISTICS

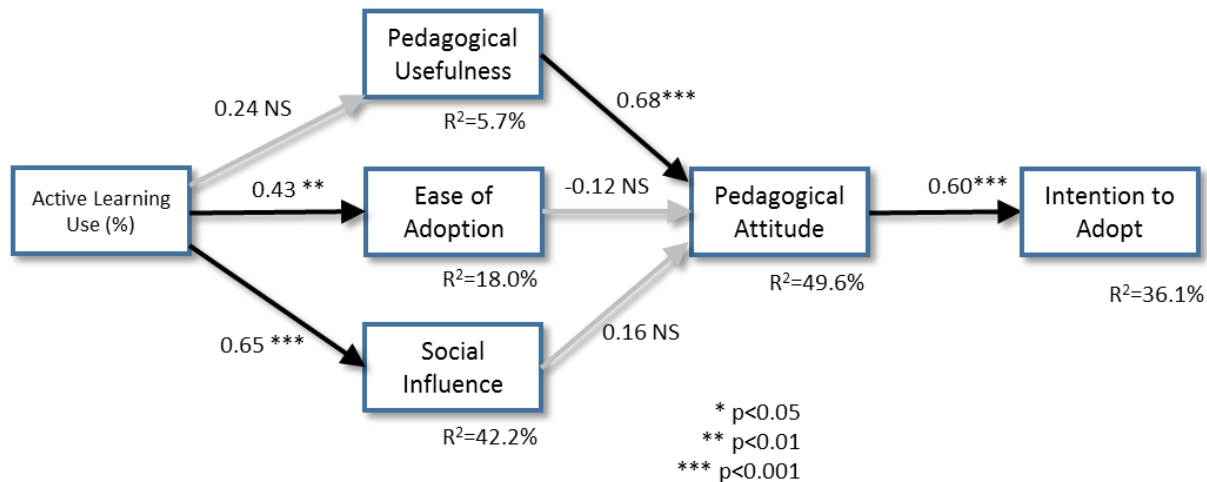
| | Minimum | Maximum | Mean | Std. Deviation |
|----------------------------|---------|---------|------|-------------------|
| Perceived Usefulness | 3.00 | 5.00 | 4.40 | 0.543 |
| Perceived Ease of Adoption | 2.33 | 5.00 | 3.67 | 0.662 |
| Social Influence | 2.00 | 5.00 | 3.55 | 0.840 |
| Pedagogical Attitude | 1.67 | 5.00 | 4.60 | 0.680 |
| Intent to Adopt | 3.00 | 5.00 | 4.41 | 0.580 |

Results

TAM is a well-tested and established theory. For that reason, the decision was made *a priori* to use $\alpha=0.05$ as a significance level for testing. Although the sample is relatively small ($n=37$), the expected effect size predicted by TRA should provide a rigorous standard for the results while still controlling for Type I error.

To determine the nature and extent of the relationships between external factors and beliefs, between beliefs and attitudes, and between attitudes and intention to adopt, a series of ordinary least squares (OLS) models were run (Figure 1). All reported regression coefficients are standardized. For all models with multiple independent variables, collinearity diagnostic tests for all models indicate that multicollinearity was not a problem (i.e., variance inflation factors were all less than 2).

Figure 2: Pedagogical Acceptance Model Results



TRA predicts that relevant external factors become a basis of one’s beliefs about the world. To test this hypothesis, a series of regressions were run using the percentage of time using active learning as a predictor for the three pedagogical beliefs. Active learning percentage was a significant predictor for social influence ($\beta=0.65$; $p<0.001$; $R^2=42.2\%$) and ease of adoption ($\beta=0.43$; $p=0.01$; $R^2=18.0\%$), but not perceived usefulness ($\beta=0.24$; $p=0.16$; $R^2=5.7\%$). These results corroborate H1a and H1c, but not H1b.

The next model tests the relationships between beliefs and attitudes—that is, the effects of perceived ease of adoption, perceived usefulness, and social influence on pedagogical attitude. The resulting model explains 49.6% of pedagogical attitude’s variance. Although perceived usefulness was highly significant ($\beta=0.68$; $p<0.001$), perceived ease of adoption and social influence were not ($\beta=-0.12$, $p=0.39$; $\beta=0.16$, $p=0.27$, respectively). H2b is therefore corroborated, but H2a and H2c are not.

For attitude’s prediction of intention to adopt, pedagogical attitude was used as a predictor of intention to adopt active learning pedagogies. Pedagogical attitude ($\beta=0.60$; $p<0.001$) was a strong predictor of intention to adopt, and the resulting model explained 36.1% of its variance. The model supports hypothesis H3.

Mediation Tests

Four steps are required to test for mediation [Baron, R. & Kenny, 1986]. Step 1 requires that the causal constructs (i.e., the beliefs) be significantly related to the outcome (i.e., intent to adopt). Step 2 requires that the causal variables (i.e., the pedagogical and trusting beliefs) are significantly related to the mediator (i.e., the attitudes). Step 3 requires that the mediator be significantly related to the outcome variable, with the causal variable in the regression. Finally, Step 4 requires that the regression coefficient of the causal variable in the Step 3 regression drop to near zero. If full mediation is present, the causal variable’s effect on the outcome—with the mediator present—should be close to zero.

Because the above regression analysis demonstrated that perceived usefulness is the only significant predictor of pedagogical attitude (meeting the requirements for Step 2), only this belief can be used in Step 1. For Step 1, a regression including perceived usefulness as the independent variable and intention to adopt as the dependent variable indicates that usefulness is a significant predictor of intention to adopt ($\beta=0.42$; $p=0.011$).

For Steps 3 and 4, regressions were conducted that included both the causal beliefs and the attitudinal constructs. With pedagogical attitude and perceived usefulness as predictors of intention to adopt, the regression coefficient for perceived usefulness drops significantly ($\beta=0.002$; $p=0.99$), meeting the criteria for full mediation. These results support H4 for perceived usefulness.

IV. DISCUSSION

The external factors that feed into one's beliefs act as a starting point for the proposed model. Although only the percentage time using active learning was used as an external variable, this single numeric value significantly predicted two out of the three beliefs. The supported relationships are very telling. The use of active learning was positively related to perceived ease of adoption and social influence. Exploring active learning therefore doubly reinforces the chances of successful faculty adoption. As one uses active learning more in the classroom, the practice continues to be easier. Moreover, the use of active learning tends to increase the perceptions of social pressure to continue to use the approach. Although this may be self-imposed, it indicates the importance of getting faculty to start using active learning pedagogies.

Given attitude's mediator role, TRA predicts that the formation of a positive attitude about active learning pedagogies is critical for encouraging faculty members to change their teaching approach. The significant predictors of attitude include the perceived usefulness of the pedagogy. The model explained a strong 49.6% and 62.1% of the variance for pedagogical attitude and trust, respectively. Finally, the prediction of intention to adopt was also very strong, with pedagogical attitude contributing significant variance. In total, 36.1% of intention to adopt's variance was explained by the model. These collective results support the proposed model.

The results confirming total mediation provide an important insight into the process for encouraging the adoption of active learning pedagogies. The results indicate that university administration seeking to improve the adoption of active learning approaches must target faculty attitudes regarding the pedagogies. Although beliefs clearly can have an impact on the formation of attitudes, the mediating effect indicates that positive attitudes toward the pedagogy must form if those beliefs will ultimately have an effect.

Limitations and Future Research

An obvious limitation of this study is the limited sample size ($n=37$). This sample represents a small number of faculty who were located in a specific location in Brazil. For these reasons, the results need to be interpreted with caution and future research is needed to generalize the findings to other groups. The limited sample size also restricted us from using more rigorous statistical modeling approaches, such as structural equation modeling (SEM).

The active learning percentage was also self-reported and was a single number, not a construct. The use of self-reported metrics can present problems, since they are susceptible to bias and error in estimation. The use of a single value also prevented the researcher from assessing reliability. At the same time, the limited time at UNIFEI (five days) and the number of participating faculty ($n=37$) prevented the faculty member from independently gauging the actual extent of active learning use. These limitations should be considered when interpreting the results.

In light of these weaknesses, however, this study did have some unique advantages. The data were collected from a rural university in Brazil. The relatively small size of the Itabira campus, the faculty's interest level in active learning pedagogies, and the administration's supportiveness were also unique advantages that made the data collection possible. For this study, data from 20% of the entire UNIFEI faculty were collected. Because much of extant pedagogical studies have come from the United States and Europe, this research also applies the proposed model to a previously understudied population. In addition, two follow up studies in Itabira are planned for summer 2017 and 2018, and additional data collections are planned to continue to understand how PAM can be improved. The continuing research will collect follow up metrics of actual use, so that intention to adopt's predictive strength can be understood in this new context.

As mentioned in the hypothesis section, before the data collection the researchers were guided by initial interviews with UNIFEI faculty and administration. These interviews resulted in a change to the expected relationship *a priori* between the percentage time lecturing and social influence. This change was empirically supported, and was actually one of the strongest relationships in this study, but requires confirmation using an additional data set. For researchers seeking to extend this study, therefore, it is possible that cultural elements may moderate some of the proposed relationships. The relationship between percentage time lecturing and social influence could differ at an institution that wields more control

over its faculty's teaching methods, or is known to widely utilize active learning approaches. The effects of culture and academic environment would provide additional insight into this study's results.

Because this study was one of the first that empirically explored the factors that encourage adoption of active learning pedagogies, the researchers strongly encourage other researchers to build on the results. One clear opportunity is to identify additional external factors that feed into pedagogical beliefs. Additional insight is also needed into the relationship between intention to adopt and actual adoption. Finally, this study focused more on intrinsic motivational factors, but colleges and universities frequently rely on measures that focus on extrinsic motivation (e.g., pay to attend workshops, providing release time). More insight is needed to understand the relative efficacy of these different motivational approaches.

Conclusion

In light of the increased calls for academia to improve its teaching methods, additional research is strongly needed to better understand how universities can encourage their faculty to explore more innovative pedagogies than simple lecture. The researchers therefore encourage educational researchers to examine pedagogical adoption in more depth—especially using empirical methods—so that academia can continue to improve its collective learning environment. Although conceptual articles have proposed strategies for encouraging faculty to adopt active learning strategies [Grimes & White, 2015], at present little empirical evidence exists on what affects the faculty adoption decision. The use of PAM is a step in the right direction: more work is needed to overcome the lecture paradigm [Davis & Arend, 2013] and encourage faculty to stick to more effective forms of teaching.

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VI. APPENDIX

Survey Questions

Scale for all questions: 1=Strongly Disagree; 3=Neither Agree Nor Disagree; 5=Strongly Agree

Pedagogical Attitude ($\alpha=0.88$)

- I think I will enjoy using problem-based learning.
- I believe problem-based learning will be fun to use.
- I think I will dislike using problem-based learning. **(Reverse-scored)**

Perceived Usefulness ($\alpha=0.83$)

- I believe using problem-based learning will improve my students' performance.
- I believe using problem-based learning will enhance my teaching effectiveness.
- Using problem-based learning will make it easier for me to be an effective teacher.

Social Influence ($\alpha=0.80$)

- At my university, the people who influence my teaching think that I should use PBL in my classes.
- At my university, the people who are important to me think that I should use PBL in my classes.
- At my university, my close friends and colleagues think I should use PBL in my classes.

Perceived Ease of Adoption ($\alpha=0.84$)

- I believe the steps for using problem-based learning in my class will be clear and understandable.
- It will be easy for me to become skillful at using problem-based learning.
- I believe I will find the guidelines for using problem-based learning to be easy to understand.

Intention to Adopt ($\alpha=0.91$)

- I intend to use PBL in my classes.
- I plan to use PBL as much as I can in the future.
- PBL will be an integral part of my class very soon.

