Advancing Accounting Research of Teaching Efficacy: Developing a Scale to Measure Student Attitudes toward Active Learning Experiences

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Abstract

Literature consistently documents a positive, direct effect of students' attitudes on learning (Lizzio, Wilson, & Simons, 2002). Hence, accounting studies describing active learning activities often report student attitudes as evidence of efficacy (e.g., Matherly & Burney, 2013), but rely on single-item instead of multi-item scales. This practice in accounting impedes evaluation of active learning activities or testing of empirical models. Thus, we (1) develop scales capturing students' attitudes, (2) use qualitative inquiry to validate our scales, and (3) empirically test our scales using Biggs' (1989) 3P Model. These scales will enable this stream to mature through more consistent constructs and sophisticated modeling.

Keywords: authentic learning, active learning, students' attitudes, scale development, assessment, explanatory mixed methodology

Education literature within an accounting context continues to rely on single item questions in evaluating pedagogical innovations. However, this practice is contrary to good principles of survey methodology. For example, Fuchs and Diamantopoulos (2009) designate criteria for situations where single-item versus scale measures are appropriate. Specifically, they contend that measures intended to capture attitudinal responses mandate the use of multi-item scales. Drawing from their research, we assert that the literature investigating the efficacy of active learning would benefit from the development of scales to capture student perceptions and attitudes.

One area of accounting education research immersed in the reliance on single items is active, authentic learning. Actively engaging students in their learning "is increasingly recognized as a vital ingredient in the university context" (Hawtrey, 2007, p. 143). Prince (2004) identifies three broad categories of benefits related to active learning: increased content knowledge (i.e., cognitive domain), enhanced students' attitudes (i.e., affective domain), and improved results regarding "pragmatic items [such] as student retention in academic programs" (p. 224). This trend toward more active learning has impacted accounting academics at the university level through various calls to shift from a passive teaching approach to one that encourages students' active participation in the learning process (Fowler, 2006).

Prior education research demonstrates that learning environments have direct effects on students' content mastery (Lizzio, Wilson, & Simons, 2002). Thus, the accounting education literature frequently relies on positive student attitudes as a desirable outcome associated with active learning activities (Apostolou et al., 2013). For example, in 2011, our review showed that 63% of the 41 active learning articles published in the four leading accounting education journals reported students' attitude toward (perception of) an activity as evidence of the activity's efficacy. The questions asked on the evaluations generally fell into two categories: general questions about the active learning experience and specific questions about the activity's learning objectives. In these studies, attitudinal student responses are captured and evaluated using single-item measures.

In this article, we build on prior literature to develop four scales to measure students' attitudes about the general active learning experience. Our hope is that use of these scales by accounting education researchers will increase the rigor of research in this stream. It is in this spirit that we have added a qualitative component to our determination of validity and reliability.

LITERATURE REVIEW

Principles of Survey Methodology

This paper focuses on the construct measurement of single versus multiple survey items. Pedhazur and Schmelkin (1991), when discussing construct validation, state, "The use of a single indicator for the measurement of a construct...almost always poses insurmountable problems, because it is not possible to identify and separate the different sources of variability of the indicator in question" (p. 56). While this statement justifies the reliance on multiple items for construct measurement, the topic was revisited by Bergkvist and Rossiter (2007), who contend that single-items are appropriate in many instances. They examined the application of both single and multiple item scales and documented that predictive validity is not compromised by relying on single-item measures for attributes that are "concrete and singular." Bergkvist and Rossiter summarize the arguments from the extant literature for using multiple items. The item in their list most relevant to this study is that multiple items are "necessary if [the] object is abstract or [the] attribute is abstract" (p.178). Ultimately, Bergkvist and Rossiter assert that their study supports the use of single-item measures for constructs such as attitude, which they consider "doubly concrete." In their terms, "doubly concrete" occurs with a simple object (i.e., an advertisement) and simple attribute (i.e., "liking the advertisement").

In contrast, Diamantopoulos (2005, p. 2) contends that "this line of argument...goes against the fact that constructs, by their *very* nature, are abstract entities." Fuchs and Diamantopoulos (2009) specify eight criteria to determine when single items can yield reliable results. When attempting to capture an abstract construct, Fuchs and Diamantopoulos repeat a general guideline that "the use of multiple-item measures is required, because most constructs, by definition, are too complex to be measured effectively with a single item" (p. 202). Furthermore, single-item measures may be too vague for respondents to incorporate all facets of the construct into their evaluation. Diamantopoulos, Sarstedt, Fuchs, Wilczynski, and Kaiser (2012) summarize their review of the marketing literature as demonstrating "that the predictive validity of single items varies considerably across different [concrete] constructs and stimuli objects" (p. 434). Ultimately, the results of their simulations suggest that in regards to predictive validity, multi-item scales are clearly superior to single items.

Active, Authentic Learning Experiences

Active learning is a component of the authentic learning educational movement that seeks to increase students' motivation and learning (Ma & Lee, 2012, p. 272). The

structural ideas of authentic learning in education are often credited to Piaget and other Constructivists (Schreiber & Valle, 2013) who believed that learning is an active, not passive, process, which connects new knowledge to existing knowledge through interaction and analyses, within a context that will be applicable in a work setting (Barr & Tagg, 1995; Brown, Collins, & Duguid, 1989; Lave, 1988; Piaget, 1954, 1974). Prince (2004) further defines active learning "as any instructional method that engages students in the learning process...While this definition could include traditional activities such as homework, in practice active learning refers to activities that are introduced into the classroom" (p. 223). With active learning, students are involved in the learning process through an activity that requires them to "think about what they are doing" (Smith & Cardaciotto, 2011, p. 57). Thus, active learning goes beyond simply participating in an activity in that students must engage in deeper intellectual thought, such as evaluation, synthesis, and reflection (Bonwell & Eison, 1991; Fink, 2003; Smith & Cardaciotto, 2011).

Rule (2006) evaluated 45 articles in the fields of education, as well as arts and sciences, to establish parameters to determine authentic learning. The four focus areas for an authentic learning experience are:

1. engages students in problems that simulate the "work of professionals,"
2. employs critical thinking skills using open-ended inquiry,
3. involves a "community of learners," and
4. incorporates activities that are learner-centered and commonly self-directed.

Authentic learning positions students to apply the concepts throughout the learning process (Ma & Lee, 2012). Research in the fields of finance and accounting report increased undergraduate student satisfaction and experiences of deep learning resulting from authentic learning activities (Brimble, Cameron, Freudenberg, Fraser, & MacDonald, 2012; Hui & Koplin, 2011; Killian, Huber, & Brandon, 2012; Turner & Baskerville, 2011).

Relevance of Student Attitudes and Perceptions

Learning environment research receives considerable attention in the broader education literature (Fraser, 1998; Opdenakker & Minnaert, 2011; Senocak, 2009; Walker & Fraser, 2005). Lizzio et al. (2002) rely on Biggs' (1989) 3P Model, which describes the learning process as an interaction among presage (learning environment and student characteristics), process (students' learning style), and product (learning outcomes). Within this model, learning environment encompasses situational characteristics, such as teaching method and course structure. Lizzio et al. (2002) indicate a general proposition

that it is students' perceptions toward "their learning environment, in light of their motivations and expectations, which determine how situational factors influence approaches to learning and learning outcomes" (p. 28).

SURVEY DEVELOPMENT

Selection of Articles

To construct multi-item scales measuring student perceptions of active learning within an accounting setting, we developed a survey that students completed at the end of the semester, which included four active learning activities. We wanted to include a broad set of items that accounting educators have recognized as important student attitudes. Consequently, we searched ABI Inform (a database of business periodicals) for studies evaluating students' attitudes toward active learning, with a specific emphasis on selecting articles across sub-disciplines within accounting. When evaluating the individual survey items for inclusion in our survey, we intentionally selected ones that reflected the active learning experience and ones that could be generalized across different activities. Thus, our survey consists of a compilation of items selected from the articles discussed in the following section.

Selection of Specific Survey Items

We used Montano, Cardoso, and Joyce (2004) as a starting point since this article provides the most comprehensive list of survey items concerning students' attitudes toward active learning within an accounting setting. Their article includes 40 items, assessing the following sub-categories: content learning, skill development, motivation, general assessment, and specific questions about the activities. Since our desire was to create scales with broad applicability, we removed items that were not generic in nature. In all, we selected 20 of the Montano et al. survey items.

We then expanded our survey instrument by including items from four other accounting-related active learning articles: Chu and Libby (2010); Murphy (2005); Morse, Ruggieri, and Whelan-Berry (2010); and Scofield and Dye (2009). We selected an additional 21 survey items from these articles with two purposes: 1) to select items of a generic nature that address the active learning experience and 2) to provide an incremental contribution to the Montano et al. items. Thus, our survey included 41 items regarding students' attitudes toward the active learning experience, which were rated on a seven-point scale, where 1=strongly disagree and 7=strongly agree.

METHOD

Sample Description

The survey was administered at the conclusion of Managerial Accounting Principles courses where four hands-on, in-class active learning activities were implemented. The survey's first page provided students with a brief description of the active learning activities to anchor their answers to the general active learning experience associated with these four activities.

Students were in three classes at one private university and two classes at a different private university. We received 120 usable responses, which represented a 90% response rate for the students enrolled as of the semester's end. To avoid introducing bias into students' responses, the survey was administered by a colleague at each university. The students were informed through a pre-prepared script that their professor would not be given access to information about their participation or survey responses until after the semester ended.

Analysis of the demographic information indicates that 42.5% of our respondents were female and were 20.6 years old on average. The students were mostly full-time (97.5%) with cumulative GPAs averaging 3.2. A major in business was reported by 95.8%, with 23.9% of the respondents indicating accounting or accounting combined with another business major. As expected, 56.3% of the students were sophomores with juniors constituting another 31.9%.

Scale Development

The purpose of factor analysis is to determine the fundamental dimensions that underlie a group of survey items (Hair, Black, Babin, Anderson, & Tatham, 2006). Thus, we undertook an exploratory factor analysis (EFA) with all 41 of the survey items assessing students' attitudes toward the active learning experience. Per Tabachnick and Fidell (2001), we used maximum likelihood as the factor extraction method (to increase the possibility of yielding the population correlation matrix) and promax as the rotation technique (an oblique method as the resulting factors are expected to be subscales of an overall student attitude, and thus, correlated). Also, we used minimum factor loadings of 0.50 to determine acceptable loadings, as Hair et al. (2006) indicate that level as "practically significant." In determining the number of factors, we relied on the common eigenvalue minimum of 1.0. In addition, according to Hair et al.'s (2006) guidelines, our sample size is sufficient for identifying significant factors.

We commenced a procedure for interpreting the factor matrix. For this evaluation, we relied on five steps in the process described by Hair et al. (2006). First, we examined the factor loadings generated in the factor matrix. Not surprisingly, this EFA produced unclear results. During this initial evaluation, 14 of the 41 items either had significant cross-loadings or failed to load (given our minimum of 0.50). In other words, this initial EFA failed to produce a simple structure for the survey items (i.e., where an item has one significant loading on one factor) that resulted in distinct constructs. Second, we reviewed each item and identified the significant loadings of each, across the factors. Third, we examined the communalities for each of the 41 items. These values indicate the amount of variance for each item that is accounted for by the factor solution (Hair et al., 2006). We identified four items that were not sufficiently explained through the factor analysis using the 0.50 guideline.

The fourth step is to determine if the factor model should be re-specified. Thus, the goal is to make a decision regarding how problematic items are treated. For instance, Hair et al. (2006) list these problematic items as ones that (a) have no significant loadings, (b) have too low of a communality, or (c) have a significant cross-loading. One goal of factor analysis is data reduction that enables the replacement of the original data variables with a set of representative variables that facilitate subsequent statistical analysis. Thus, the objective of factor analysis is to minimize cross-loadings and "make each variable associate with only one factor" (Hair et al., 2006). Therefore, we eliminated items that failed to significantly load on a factor, resulted in a low communality, or provided significant cross-loadings. At this stage, the remaining set included 26 items. To keep as many items in the analysis as possible, we re-estimated the EFA by re-considering each of the 15 eliminated items, as we wanted to determine if the elimination of an item might correct a cross-loading issue for another item. After completion of this process, the factor analysis produced a four-factor solution with 27 items that each significantly loaded on only one factor. Before proceeding to the fifth step, which involves labeling the factors, we first provide information regarding the empirical examination of the factors.

ANALYSES

After we finalized the factor solution, we followed the guidelines from Nunnally and Bernstein (1994) to examine the factors, which included undertaking confirmatory factor analyses (CFA), computing Cronbach's alphas, and reviewing the range of responses. Once again, we used maximum likelihood extraction along with promax rotation. These factor loadings are provided in Table 1. A CFA for each of the four factors yields a single

factor. All loadings exceed the 0.50 guideline proposed by Tabachnick and Fidell (2001). Thus, evidence is provided for the uni-dimensionality of the scales.

Table 1. *Rotated factor matrix – confirmatory factor analysis final solution*

			Cronbach's alpha
Impact on Studying for Current Class (variance explained of 74.8%)			0.951
Item No		Factor Loading	
1	I used what I learned from the activities to study for the exams. [a]	.866	
The hands-on activities...			
2	helped me to clarify the most difficult contents of the subject by making them easier to understand. [b]	.821	
3	made me study better. [b]	.849	
4	motivated me to work harder in the class. [b]	.765	
5	helped me in preparing for examinations. [c]	.901	
6	changed my attitude in the way I approach my studying. [b]	.787	
7	provided additional help (beyond merely doing the homework) in terms of learning managerial accounting. [a]	.819	
8	helped me better prepare for the exams. [c]	.927	
Perception of Authentic Value (variance explained of 78.2%)			0.953
1	I think that the time devoted to the activities was worthwhile. [b]	.885	
2	I believe including the active learning activities in this course was useful. [b]	.836	
3	I wish these types of activities were used in all my classes. [d]	.842	
4	I would like to see more active learning activities in my future classes. [c]	.892	
5	All things considered, I believe that the active learning activities were worthwhile. [b]	.928	
6	I like this type of hands-on activity more than the traditional class lecture. [c]	.793	
7	I would like it if this type of hands-on activity was used in other courses. [c]	.864	

Attitude toward Current Class (variance explained of 73.5%)			0.927
The hands-on activities...			
1	helped me feel positive towards the accounting class. [e]	.868	
2	made it more comfortable for me to participate in class discussion. [d]	.802	
3	helped me to understand, widening and relating my ideas. [b]	.791	
4	improved my opinion on the contents of the class. [b]	.833	
5	helped me feel positive towards accounting. [e]	.842	
6	made me feel more actively involved in the learning process for managerial accounting. [a]	.817	
Interest in Current Class (variance explained of 68.2%)			0.903
1	The active participation during the activities made the class more interesting. [b]	.835	
2	I found that the activities made the topic of managerial accounting more interesting. [a]	.856	
3	In general, I think these activities reveal the teacher's concern for quality teaching. [b]	.601	
4	The hands-on activities have been interesting. [b]	.787	
5	The hands-on activities allow sharing of ideas, responses and points of view with my peers and teachers. [b]	.734	
6	The hands-on activities made the class more interesting. [a]	.883	

Only the factor loadings exceeding 0.50 are included in the table.
Extraction Method: Maximum Likelihood. Rotation Method: Promax with Kaiser Normalization.
Items were modified from: [a] Murphy (2005); [b] Montano et al. (2004); [c] Chu and Libby (2010); [d] Morse et al. (2010); [e] Scofield and Dye (2009).

The correlation matrix in Table 2 reports in the diagonal the Cronbach's alpha for each scale. All of the values exceed the generally accepted cutoff of 0.70 advocated by Nunnally and Bernstein (1994), as well as the less stringent cutoff of 0.60 for exploratory research such as what was done in this paper (Hair et al., 2006). Therefore, each factor demonstrates reliability. Also in Table 2 are the correlation coefficients between the pairs of constructs. A comparison of the Cronbach's alpha and each of the correlations shows that the correlation within each construct is higher than the correlation across constructs. Thus, evidence of discriminant validity is obtained.

Table 2. *Reliability and correlation matrix: The Cronbach's alpha values are reported in the diagonal, while the other values represent the correlation coefficients.*

	Studying	Authentic	Attitude	Interest
Studying	0.951			
Authentic	0.791**	0.953		
Attitude	0.720**	0.707**	0.927	
Interest	0.642**	0.737**	0.729**	0.903

*** significant at p < 0.01 (2-tailed)*
Where: Studying=Impact on Studying for Current Class;
Authentic=Perception of Authentic Value;
Attitude=Attitude toward Current Class; Interest = Interest in Current Class

Most items use the full range of potential responses. A review of the kurtosis and skewness showed that all the variables demonstrate accepted levels according to general guidelines noted by Kline (2005) of < 3 for skewness and < 10 for kurtosis.

Interpretation of Scales

As the final step in the factor interpretation, we asked other accounting faculty to review the factor groupings to provide independent labels describing each one. Based on this feedback and our own review, we labeled the four factors: Impact on Studying for Current Class, Perception of Authentic Value, Attitude toward Current Class, and Interest in Current Class.

The first factor, Impact on Studying for Current Class, consists of eight items that capture whether the active learning activities aided them when studying. Scale items include "The hands-on activities helped me better prepare for the exams." The second factor, Perception of Authentic Value, measures students' opinions about the extent to which the active learning activities were worth the time invested and whether they should be used in future classes. The seven items in this factor include, "I think the time devoted to these activities was worthwhile."

The third factor, Attitude toward Current Class, includes six items that assess the impact that the activities have on the students' overall opinion toward the current class. The items evaluate whether, for example, "The hands-on activities improved my opinion on the contents of the class." The fourth factor, Interest in Current Class, captured students' attitudes regarding whether the active learning activities made the current class more interesting. The six items in this scale include "The active participation during the activities made the class more interesting."

The empirical data collected result in these four distinct factors that now can be used to measure students' attitudes and perceptions regarding active learning. In the next section, we supplement this empirical data with a qualitative review of student feedback.

EXPLANATORY MIXED METHODOLOGY

In explanatory mixed method design, triangulation consists of first collecting quantitative data and then collecting qualitative data to "help explain or elaborate on quantitative results" (Creswell, 2008, p. 560). In this study, factor analysis refined and reduced items on a survey instrument to form scales. These scales focused on the students' perception of value added from the incorporation of active, authentic learning. Using qualitative inquiry, we followed this factor analysis with the thematic evaluation of open-ended questions designed to evaluate the course's strong and weak points; questions whose analysis served as a secondary source to "increase scope, depth and consistency" (Flick, 2002, p. 227) of the scales and provide an enriched student voice to the value of active, authentic learning experiences as quantified in the scales (Creswell & Plano Clark, 2007).

We based the qualitative analysis on data gathered from the end-of-course student evaluation form for Researcher A. The university distributes this student evaluation of teaching (SET) instrument throughout the campus to collect student perceptions. Consequently, the SET did not prompt students to recall the active learning activities. Data from the SET were collected approximately one month after the last in-class activity was completed. We analyzed students' responses to two open-ended questions before and after the introduction of active, authentic learning activities. These questions reveal students' attitudes toward the overall course by asking them to comment on the 1) strong points of the course, and 2) weak points of the course.

SET respondents consisted of 101 students, 38 before activities (BA) and 63 after activities (AA), who were enrolled in Researcher A's course. We eliminated 79 of the 202 potential student comments as the student did not provide a comment (n = 75) or the comment did not address the question asked (n = 4). Thus, we relied on 123 comments (44 BA, 79 AA).

Multiple, intensive readings combined with constant comparison of survey responses by the researchers established the parameters for analytical groupings. Inter-rater agreement was negotiated on the summative and salient attributes of each theme, subtheme, and category.

QUALITATIVE ANALYSIS

Three themes on student attitudes toward strengths and weakness in the introductory managerial accounting course emerged: 1) Class Experience, 2) Relevance, and 3) Course Materials. Each theme divided into four subthemes reflecting a two-by-two matrix of 1) columns titled Self-Directed versus Teacher-Directed Learning and 2) rows titled Recognition versus Lack of Recognition of the Value and Application of Knowledge. Comments classified as self-directed learning often were written in first person or related to the student's personal experience, while teacher-directed comments emphasized decisions made by the instructor.

As seen in Table 3, two of the themes, Class Experience and Relevance, further subdivided into several categories as discussed below. Table 3 presents the relative frequency of comments for each theme, subtheme, and category stated as a percentage of the total BA comments and AA comments, respectively.

The Class Experience Theme and the Relevance Theme include many comments that are similar to and congruent with the four factors presented in Table 1. The Relevance Theme also addresses the authenticity of the learning environment. Combined, these two themes constitute over 85% of both the BA and AA student comments; consequently, they are the focus of the following discussion.

Class Experience Theme

The Class Experience Theme relates to students' comments regarding different aspects of their experience in the introductory managerial accounting class. This theme comprised the majority of student comments both before and after the activities were introduced (BA = 55%, AA = 60%). Overall, students made more positive comments after the activities were introduced (BA = 25%, AA = 30%). Within each subtheme, four categories emerged: Testing, Presentation of Classroom Content, Difficulty, and Value/Interest/Attitude (see Table 3).

The category Value/Interest/Attitude dominated the BA comments (30%), with comments like "Good stuff to know" and "Important and seems practical and useful." In contrast, the most frequent AA comments relate to the category Presentation of Classroom Content (22%) with statements such as "The activities we did in class were helpful and explained the work very clearly." The noticeable increase in positive comments for this category (BA = 5%, AA = 17%) highlights the lasting impression of the active learning activities.

The Class Experience Theme includes all comments that specifically mention the active, authentic learning activities. Hence, the comments provided by the AA students give voice to the four-factor solution presented in Table 1. Table 4 contains selected student comments that convey similar sentiments as each factor and allow for a richer factor interpretation. The selected student comments appeared on the end-of-course evaluation form after implementation of the authentic active learning activities and are in response to the open-ended prompt: "Strong Points–The Course." The comments convey similar sentiments as the four-factor solution presented in Table 1.

Table 3. *Qualitative Summary of Themes in Student Comments: relative frequency of student comments on the end-of-semester course evaluation forms before and after the introduction of the authentic active learning activities*

Panel A: Class Experience Theme

	Before Activities (n=24/44=55% overall)		After Activities (n=48/79=61% overall)	
SUBTHEMES	Self-Directed Learning	Teacher-Directed Learning	Self-Directed Learning	Teacher-Directed Learning
Recognition of the Value and Application of Knowledge	16%	9%	15%	15%
Testing	---	4%	1%	1%
Presentation of Classroom Content	---	5%	4%	13%
Difficulty	---	---	3%	---
Value/Interest/Attitude	16%	---	7%	1%
Lack of Recognition of the Value and Application of Knowledge	9%	21%	5%	25%
Testing	2%	2%	1%	8%
Presentation of Classroom Content	---	3%	---	5%
Difficulty	2%	7%	1%	7%
Value/Interest/Attitude	5%	9%	3%	5%

Panel B: Relevance Theme

	Before Activities (n=16/44=36% overall)		After Activities (n=21/79=26% overall)	
SUBTHEMES	Self-Directed Learning	Teacher-Directed Learning	Self-Directed Learning	Teacher-Directed Learning
Recognition of the Value and Application of Knowledge	18%	18%	15%	8%
Work-Related Authenticity	13%	---	10%	3%
Course-Specific Authenticity	5%	18%	5%	5%
Lack of Recognition of the Value and Application of Knowledge	---	---	---	4%
Work-Related Authenticity	---	---	---	1%
Course-Specific Authenticity	---	---	---	3%

Panel C: Course Materials Theme

	Before Activities (n=4/44=9% overall)		After Activities (n=10/79=13% overall)	
SUBTHEMES	Self-Directed Learning	Teacher-Directed Learning	Self-Directed Learning	Teacher-Directed Learning
Recognition of the Value and Application of Knowledge	2%	---	5%	1%
Lack of Recognition of the Value and Application of Knowledge	---	7%	3%	4%

The frequencies are reported as a percentage of the total comments made either before the activities (n=44) or after the activities (n=79), respectively.

Table 4. *Selected student comments related to the Four-Factor Solution*

Factor 1: Impact on Studying for Current Class
In class activities. Explains process thoroughly.
Material that we go over in class is relevant to what is covered on the exam.
Liked the different exercises we performed so that we could better understand the material.
Factor 2: Perception of Authentic Value
Material is very important for real life work.
A lot of useful information that will be used in everyday business life.
In class activities, examples done in class.
Factor 3: Attitude toward Current Class
I have learned a lot about managerial accounting which will help me in the future.
Interactive.
Very informative, equips us with relevant skills and knowledge.
Factor 4: Interest in Current Class
I liked that we did the in-class exercises/activities because it helped mix up the class.
She did the hand on exercises that really help as well as makes the class fun.
It was very interesting material.

Relevance Theme

The Relevance Theme includes student comments about how the introductory managerial accounting course prepared students for real life work and provided appropriate content. Within each subtheme, two categories emerged: Work-Related Authenticity and Course-Specific Authenticity. Both the BA and AA students commented with similar frequency on Work-Related Authenticity (13% and 14%, respectively). For example, one student wrote: "This course is great in that it will help in the future with making important decisions for a firm!"

Comments made by students under the Relevance Theme predominantly speak to their valuing of authentic learning in the classroom. Student comments in the Relevance Theme also correspond to the four-factor solution presented in Table 1.

Ultimately, this qualitative analysis documents students' perceptions and attitudes toward the course and its content and served as a secondary explanation to the quantitative results. Themes and student comments that supported these themes resulting from factor

analysis expanded quantitative results and gave voice to the underlying construct within the factors revealed (Creswell & Plano Clark, 2007).

ADDITIONAL ANALYSES

Our next step is to empirically examine the difference between the reliance on a single question versus a multiple-item scale. We apply two approaches to studying this issue: 1) determine the reliability of the single-item measure and 2) testing a structural equation model of expected outcomes for the measures.

Loo (2002) computed the reliability of single-item scales in comparison to estimated minimum reliability benchmarks. His calculations applied Spearman's "classical formula for the correction for attenuation" as follows (2002, p. 68):

$$\overline{r_{xy}} = \sqrt{r_{xx}}\,\sqrt{r_{yy}}$$

Where: r_{xy} *= the correlation between variables*

r_{xx} *= the reliability of the single item x*

r_{yy} *= the reliability of the multi-item scale y*

Wanous, Reichers, & Hudy (1997) state a reasonable minimum estimated reliability of a single item of approximately 0.70. We calculated the correlation between the scale and the item that resulted in the highest load on that factor. By substituting this number, along with the scale's Cronbach's alpha, we computed the following estimates of reliability for the single item: Impact on Studying Scale, Item 8 – 0.947; Perception of Authentic Value, Item 5 – 0.948; Attitude toward Current Class, Item 1 – 0.900; and Interest in Current Course, Item 6 – 0.919. Therefore, this analysis suggests that use of a single item to measure these constructs may be appropriate.

To apply a more rigorous analysis of the issue, we constructed a structural equation model testing our scales as antecedents to students' approaches to learning. This model is based on the research by Lizzio et al. (2002) who depict the learning environment as an antecedent to the same approaches to learning scales. We then estimated the model using SPSS AMOS version 20. The model applying the single item fails to generate a model with acceptable fit indices. In contrast, the model that includes the multiple item scales provided acceptable fit indices.

Our goal with this analysis is not to test hypotheses. Therefore, we will not delve into an analysis of each relationship. Our purpose is to determine if single items are acceptable in estimating models relating our scales to expected outcomes. Examining the

results from this perspective indicates that the single item did not result in a useable model. The Hoelter's Critical N supports our contention that sample size is not a restriction in this case, as our sample exceeds the minimum level specified by that measure.

CONCLUSION

Fuchs and Diamantopoulos (2009) demonstrate that the variation in attitude and perceptions necessitates multi-item scales to fully capture the constructs of interest. This occurrence is especially prevalent in studying the efficacy of active learning. These scales provide researchers with the building blocks to investigate and model the role that student attitudes (i.e., affective domain) have on specific learning outcomes (i.e., cognitive domain).

To improve the scales' generalizability, we relied on existing survey items that have already been used to measure students' attitudes regarding active learning experiences. We specifically selected items from articles across accounting sub-disciplines with different activity characteristics. We undertook explanatory mixed methodology using the end-of-course commentaries to conduct a follow-up explanation model to expand quantitative results (Creswell & Plano Clark, 2007). In both the scales and the deconstruction of dialogue, students related to issues of class experience, relevance of the course, and course materials.

We recognize that the development of these scales was done within the context of a single course with a limited set of activities. In addition, we worded the survey items to focus students' responses on our learning activities. Thus, we anticipate that some wording may require modification for future studies. However, minor variations that retain the primary stem of the items would not be expected to change the applicability of the scales across settings. Nonetheless, these issues related to generalizability highlight the need for future researchers to assess the stability of these scales across different samples and activities. Ultimately, we envision these scales as being a necessary first step toward the ability of future researchers to efficiently and effectively test a more comprehensive model of the benefits of active learning.

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