

Student Engagement Across Cultures in the Hospitality Classroom *Investigating Lecture Software*

Alison J. Green¹, Gail Sammons,² and Alice Swift³

Abstract: Most instructors are looking for ways to improve student engagement in higher education classrooms across the globe. With the influx of tablets and laptops as the tool for students in the 21st century, the question arises of how best to integrate technology into the design of a lecture and is there a difference when designing a lecture with technology across cultures? The purpose of this study was to investigate lecture software in the hospitality classroom. The study was located in Singapore and the U.S., with a total of 337 participants. The instrument, to collect the perceptions of the lecture software was the Student Engagement Survey (SES), which revealed that active learning was significant when using lecture software in both locations, and active learning leads to student engagement.

Keywords: lecture software, cross cultural education, hospitality education, active learning, student engagement

Across the globe instructors seek new ways to reach learners in higher education, to promote higher student engagement, and to achieve overall satisfaction from lectures. Over the last two decades there has been an influx of new technology for the classroom, as well as a shift in what students bring to class to capture lecture notes and to take part in class activities. New technology has also changed the way students grasp the delivery of the material. Laptops and tablet devices are used throughout education, and they can be an opportunity to leverage technology with student engagement around the world if used correctly in the design of a lecture.

Classroom clickers, smartphones, tablets, laptops, and computers are different technologies that are used within the classroom. Instructors who include technology into the design of their lecture find that the outcome is student activity, which leads to student engagement. If students are willing to use the technology offered by the instructor, it will lead to increased engagement (Brown, Thomas, & Thomas, 2014). In the literature there still is hesitation with regards to instructors using classroom technology fearing the students are cheating or surfing the Internet, instead of being engaged during lectures (Coates 2010; Samson 2010; Trowler 2010).

Many instructors across the globe still value the teacher-centered model versus the learner-centered model where the student is in charge of their motivation to learn (Blumberg, 2008). Even

¹ Department of Hospitality, Recreation and Resort Management, University of West Florida 11000 University Parkway, Pensacola, FL 32514. green@uwf.edu

² William F. Harrah College of Hotel Administration, University of Nevada Las Vegas, 4505 S. Maryland Parkway, Box 456021 Las Vegas, NV 89154-6021. gail.sammons@unlv.edu

³ William F. Harrah College of Hotel Administration, University of Nevada Las Vegas, 4505 S. Maryland Parkway, Box 456021 Las Vegas, NV 89154-6021

more so, looking at how culture plays a large part of how students learn with technology is scarce in the research. One model, The Hospitality Learners Model (Green & Sammons, 2014) approaches the design of a hospitality class (see Figure 1) from a learner-centered view. With understanding the that technology, specifically laptops, being used in the classroom, the question was if there is a difference of student engagement using laptops across the globe, specifically to look at Singaporean students and United States students in a hospitality classroom. The purpose of this study was to measure overall satisfaction of hospitality students in the United States and Singapore with instructional technology (lecture software).

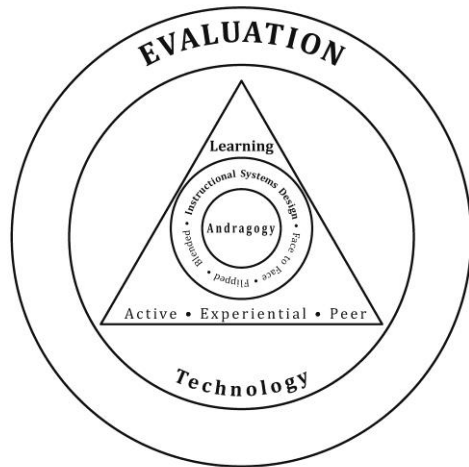


Figure 1. The hospitality learners model.

Literature Review

Bojinova and Oigara (2011) found that the incorporation of technology in the classroom as part of an active learning design increases overall engagement, performance, and learning. This increase also allows students to apply critical thinking skills in context, which leads to higher order learning (Crouch & Mazur, 2001) and thus improves the overall cognitive process of the students' knowledge and thinking (Blasco-Arcas et al., 2013). Collaborative, peer-to-peer learning plays an important role in the classroom. In an interactive classroom, the student is able to increase in comfort level within the class amongst peers and with the instructor. Thus a higher engagement of material happens, which then results in an increase of performance and learning (Blasco-Arcas et al., 2013).

Lecture Software

Lecture software encourages students to follow along an instructor-led lecture by using a pre-loaded presentation, such as Microsoft PowerPoint® or Apple KeyNote®. During lecture presentation, student's respond to questions posed, and the results are collected via the polling device. Since the polling of answers is in real time, the instructor is able to evaluate the answers and respond accordingly. In addition, peer-to-peer learning occurs because students are able to answer each other's questions in real time. The peer-to-peer style of collaborative learning is essential to the practices of incorporating technology in the classroom (Crouch & Mazur, 2001). The lecture software application would cater to students with various learning styles and while allowing anonymity and encouraging a higher level of participation in the class despite potential

large class sizes (Frederick, 2011). Participation is accomplished through written communication via any technology device (laptop, tablet, or smartphone). Utilization of this particular lecture software promotes peer-to-peer and active learning, which results in increased transfer of learning. With the incorporation of lecture software in the classroom, technology would not be a deterrent. Rather, lecture software would act as a bridge for learning, which potentially can result in increased student engagement and participation (Samson, 2010).

Cross Cultural

The opportunity to attain education across the globe has increased with the onset of technology such as the internet. Over the last two decades, there has been research into how different cultures learn online (Gunawardena, Wilson, & Nolla, 2003). There has also been research comparing education with regards to culture, but very few studies that investigate instructional technology (Charlesworth, 2008), specifically between Southeast Asia and the United States in relation to higher education.

The term *culture* in education has been difficult to define in concrete or formal terms (Gunawardena, et. al. 2003). In order to investigate culture as it relates to learning, it is best to observe the internal and external cultural influences to education. In addition, the focus should also be on the historical educational approaches used, from past to present, to help shape the understanding of how students learn. Both East and West have excelled in education; however, their cultural and educational approaches may contrast in respect to higher education.

Culture and Education of the United States

When looking at global education, it is important to understand the culture, background, and upbringing of the students. Cultures in the United States (U. S.) and Singapore (SG) differ with regards to religions and government. Cultural differences are also seen in education at the post-secondary level. There are common ties and overlap between cultural values and education, especially in the United States. Traditionally, in the past century, there have been many studies focusing on learning styles, theories, and models of students in higher education (Merriam, 2001), such as with andragogy which focuses on the adult learner, as opposed to pedagogy, which focuses on the “pre-adult” or child learner (Knowles, 1968).

Hospitality Education in the United States

In relation to hospitality education specifically, additional learning theories included active learning, experiential learning, peer-to-peer learning, and active learning. Active learning, is just that, active, rather than passive. It encourages student participation in problem-solving, in both individual and collaborative activities in the classroom (Bonwell & Eison, 1991). Experiential learning is a style in which students learn through their experiences external to their physical classroom (Kolb, 1984). In hospitality education, this can take the form of internships, travel, field trips, and other activities that take place outside of the classroom. Peer learning, on the other hand, occurs when students learn from each other, rather than from their experiences (Couch & Mazur, 2001). This can take place either in a formal (classroom) or informal setting (Crouch & Mazur, 2001). Rather than operating an instructor-centered class, students will support and discuss with each other, building upon each other’s knowledge.

Culture and Education of Southeast Asia

The study of culture also plays a large role in global education, such as the religion of Confucianism. It originates from Asian countries, combining both secular and ethical mindfulness (Barron & Arcodia, 2002), and maintains that the instructor is the primary role model. Ironically, despite the instructor being the central knowledge base, students show respect for their instructor by holding back questions and maintaining silence in the classroom, regardless of whether they have questions or not (Huang, 2005). While students from Asian culture are raised differently, they are still aware of the “philosophical, pedagogical and political achievements” of the United States (Barron & Arcodia, 2002, p. 17). Barron and Arcodia (2002) discovered that students of Southeast Asia tend to be introverts. In addition, students revealed that they are studious, excel in learning from memorization, and prefer lecture-type classes (Barron & Arcodia, 2002; Cortazzi & Jin, 1996). However, rote memorization competence does not equate to understanding, as opposed to the more practical, hands on learning, as Liu and Littlewood (1997) observed. Some view Southeast Asia as having a traditional, conservative learning philosophy, which needs to be advanced to modern times by including active learning.

Student Engagement

The construct of student engagement has a broad interpretation, yet it has been tied to learner outcomes and empowerment to participate in the classroom (Coates, 2010). Engagement as an outcome is the shared responsibility for both the instructor and the student (Schoffstall, Arendt, & Brown, 2013). When students are responsible for their own learning outcomes, Coates (2010) suggests that they are interested in the subject matter, there is a higher degree of involvement. This interest is also tied to what is called learning satisfaction, which, in addition to the interest and attitude towards the subject matter, also takes into account learning theories and styles, as well as the subject matter (Kong & Yan, 2014).

Student engagement is made up behavioral, emotional, and cognitive dimensions (Bloom & Krathwohl, 1956; Trowler 2010). Behavioral engagement is the guidelines students adhere to in the allotted class time. Emotional engagement is related to the classroom environment and considered as a sense of belonging (Trowler, 2010). Finally, students achieve cognitive engagement by taking the initiative to learn, taking charge of their own learning. Each of the dimensions has a potential range from negative to positive; however successful student engagement requires positive results (Trowler, 2010). To aid in the success of positive learning outcomes, each of the three dimensions (behavioral, emotional, and cognitive) needs to be integrated into the classroom properly (Bloom & Krathwohl, 1956; Fredricks, Blumenfeld, & Paris, 2004). Suggested by Morris and Parker (2014) it is both the student and the instructor that create the engagement. In addition to the integration of the three dimensions, incorporating teaching tools and an appropriate framework into a classroom lecture also result in positive learning outcomes (Paris & Paris, 2001).

Active Learning

One method of supporting sound instructional design in the classroom is through active learning theory. Active learning occurs when students are fully engaged with the course content

and new knowledge is added on to their existing knowledge (Bojinova & Oigara, 2011). Active learning in fact is related to Vygotsky's (1978) social constructivist view of learning, which relates human interaction and subject matter in the classroom, leading to deep learning (Oigara & Keengwe, 2013). More specifically, this constructivist learning theory occurs when an individual takes his or her interpretation or meaning and builds upon previous experiences (Sternberger, 2012). This theory is extended to the classroom setting in the form of active learning, which build up knowledge and learning through student participation and engagement based on the class content, rather than simply focusing on the material being presented. When material is presented as part of the teaching strategy, students are more engaged (Debourgh, 2008) and are able to receive the new information and apply it to their existing learning structure (Oigara & Keengwe, 2013). The instructor in this case is simply a facilitator between the student and his or her learning outcome (Felder & Brent, 2005).

Traditional lecture classes have been teacher-centered, as opposed to a facilitator and support role that occurs in a learner-centered classroom that utilizes active learning (Felder & Brent, 2005). Active learning encourages students to recognize the need to participate in their own learning. This improves the chances of increased long-term retention, recall, and deeper learning (Felder & Brent, 2005; Wood, 2004). As a result, critical thinking occurs, which students can then be applied to real world situations (Bonwell & Eison, 1991). They are able to add to and build upon their own existing knowledge, or personal schema, based on the cognitive process and retention of active learning (Gagné, 1985; Oigara & Keengwe, 2013).

Context of Study

Overall there is an opportunity to study engagement of students across the globe. Another opportunity is to study students from different locations, upbringing and cultures, and the technology views, when thoughtfully placed into the design of a lecture. The guiding questions that prompted the purpose of this study pertained to looking at an instructional technology tool in hospitality education in different geographical settings.

- 1.) Are there any differences in student engagement using technology (lecture software) between students in the U. S. and Singapore?
- 2.) Are there any differences between U. S. and Singapore students when introduced to technology (lecture software) with regards to active learning, knowledge, involvement, and enjoyment of the instructional technology?

Methods

The participants in this study were students in a hospitality college ($N=337$), located in Las Vegas, Nevada and Singapore. During the spring semester 2014 the data were collected from five classes in Las Vegas ($n=170$) and from four classes in Singapore ($n=167$). All were undergraduate classes ranging between 30 and 60 students. There were five instructors from the U. S. and one from Singapore. The classes taught all were core requirements in the hospitality curriculum for both campuses. A total of five sections were taught in the U. S. and four sections were taught in Singapore. Each instructor invited to participate in this study had a prior command of technology used in the classroom, such as clickers, and were fluent in the material presented. After attending a workshop on how the lecture software worked, the instructors then used the software tool during two weeks in class in the spring 2014 semester. Each instructor used a computer lab or had students

bring their laptops to class. Instructors used the lecture software tool for presentations, polling questions, question slides, and attendance.

Instrument

The instrument Student Engagement Survey (SES) was selected, as it measured the overall satisfaction with instructional technology used in the classroom (Green, Tanford, Chang, & Moll, 2013). The SES is a 20 question instrument used to measure the constructs of active learning, knowledge, involvement, and enjoyment, on a five point Likert-type scale that ranged from 1 = strongly disagree to 5 = strongly agree, plus additional demographic questions.

Design and Procedure

The instructors loaded a PowerPoint presentation into the lecture software tool prior to the start of the class. Each instructor then added interactive activities throughout the lecture (e. g. multiple choice, short answer questions, videos). The instructor sent a link to the students via email to sign up for the lecture software. Once the student signed up, they could then access the lecture after the instructor published it online (in the cloud). The students were given a brief introduction to the software tool, basic navigation, and instructions from the instructor prior to starting the study. A link to the SES was sent to the students after the final lecture occurred the data collection period.

Analysis

Once the data collection was complete, the raw data were then downloaded into Excel, coded, and imported to SPSS 21. 0. Descriptive statistics were used to describe the sample population for demographic information. T-tests were chosen to explore the individual constructs as well as each question per location. The internal consistency per construct was evaluated by using Cronbach's alpha.

Results

There were a total of 337 participants in the study with 170 from the U. S. and 167 from Singapore (SG). Over half of the participants (U. S. = 69%, SG = 63%) were female, and most (U. S. = 81%, SG = 79%) were considered a traditional student age (18 – 24). Table 1 depicts the demographic information broken down by location.

Table 1. Demographics

	U. S. <i>n</i>	SG <i>n</i>	%
Age			
18 - 24	137	132	80.0
25-28	17	34	15.0
29 and Over	16	1	5.0
	170	167	100.0
Gender			
Female	116	105	66.0
Male	53	62	34.0
Total	169	167	100.0
Missing	1		

Construct Analysis

Table 2 presents the means for active learning, involvement, knowledge, and enjoyment and the t-tests. The Cronbach's alpha analysis for the constructs: active learning (.92), involvement (.89), knowledge (.91), enjoyment (.92), proved reliable and were over the suggested minimum criteria of .7 (Nunnally, 1978).

Each construct tested significantly different between the U. S. and Singapore. In each case per construct, it was found that students in Singapore had a significantly higher mean. To understand this further, it is essential to break down the data at individual question level and compare each outcome across locations.

Student Engagement Analysis

The results of the student engagement survey (SES) which include descriptive statistics on mean scores along with the results of the t-tests for each question are presented in Table 3. The analysis to compare the U. S. and Singapore per question found that for most of the questions asked in the survey, there was a significant difference with regards to location.

Table 2. Construct analysis

Construct	U. S. ^a		SG ^b		α	<i>t</i>	<i>df</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
Active Learning	3.69	0.88	3.98	0.71	0.923	-3.338	323.164	.001*
Involvement	3.66	0.85	3.97	0.68	0.899	-3.650	322.663	.004*
Knowledge	3.49	0.92	3.79	0.70	0.918	-3.390	315.295	.001*
Enjoyment	3.57	0.98	3.95	0.77	0.923	-3.941	317.799	.000*

Note. ^a *n* = 170. ^b *n* = 167. **p* < .05.

There were a few questions on the survey that showed no significant difference with regards to location (See Table 3). The questions that show no significant difference were:

- Using "lecture software" is helpful in reinforcing course concepts

- I would recommend the use of "lecture software" in other classes within the hospitality college.
- Lecture software are easy to use, and
- Finding out the correct answer to the "lecture software" question is important to me.

Three of the four questions where location was not significant were in the active learning construct. This construct has a total of seven questions surrounding the class, participation, engagement, and recommending the software. The fourth question "finding out the answer", was just as important in each location, thus, students do find it important understand what their peers are answering and being able to see this anonymously, but it did not test significantly different between locations.

The remaining 16 questions found that the culture in the location did matter. Investigating the means, we observed the following from the results. First, the question "Lecture software encourages me to participate in class" showed there is a difference between Singapore ($M = 4.14$, $SD = 0.74$) and United States ($M = 3.57$, $SD = 1.10$), $t(295.881) = -5.561$, $p = .000$ and should be noted in the construct of active learning. The students in Singapore found that by using lecture software in class, they enjoyed that they could participate more in the class through the software. The question "I appreciate the anonymity of the lecture software" process was significant between the two cultures: Singapore ($M = 4.14$, $SD = 3.82$) and United States ($M = 3.82$, $SD = 1.03$), $t = -3.769$ (313.908), $p = .000$. This question also falls under the active construct and although each location finds it important, the students in Singapore thought that this was much more important as they could answer a question posed to the group (e. g. a polling), be able to immediately see how others answered, and then compare their answers against their peers.

Each of the questions in the knowledge construct showed that location does make a difference in how the students feel about the lecture software. The question "lecture tools allows me to stay interested during class time" indicated this is important at the specific location: Singapore ($M = 3.89$, $SD = .081$) and United States ($M = 3.46$, $SD = 1.08$), $t = -4.121$ (313.634), $p = .000$. For Singapore, this addresses the stereotype of where the instructor delivers lectures by the traditionally, standing and delivering the material. By having a tool that allows students to write notes, asks questions to peers, this could address the point of being interested in the material, applying peer to peer learning as well as interactivity in the knowledge construct.

There were three questions that investigated the construct of enjoyment, and data showed there was a significant difference with regards to location for each of the three questions. Overall, the students located in Singapore enjoyed using lecture software more compared to the U. S. The question of "lecture software makes the class more enjoyable compared to traditional classes". The results showed Singapore ($M = 3.98$, $SD = .088$) and United States ($M = 3.57$, $SD = 1.08$), $t = -3.178$ (321.762), $p = .000$, and indicated that students in Singapore enjoy having the lecture software in their classes. This is due to the fact that most of the classes that are taught as traditional classes following the standards of the college, with most instructors delivering material in a traditional way. Thus, adhering to what is thought as traditional, the instructor is the expert that departs knowledge versus a classroom that would have interactive lectures.

The construct of involvement included five questions with four being significant. The question "I believe that I am more actively engaged in the class lectures because of lecture software" found that Singapore ($M = 4.00$, $SD = .86$) and United States ($M = 3.49$, $SD 1.11$), $t = -3.682$ (317.583), $p = .000$ students from Singapore do perceive that they are more engaged in a class when the software is included in the design of the lecture. Also by design, using lecture

software, does liven up a lecture. The results show Singapore ($M = 4.08$, $SD = 0.84$) and United States ($M = 3.61$, $SD = 1.07$), $t = -4.454$ (320.352), $p = .000$ and is perceived as important to the overall construct of involvement. As Singapore students' educational upbringing is a traditional Confucianism underpinning, by bringing in the lecture software; they found that it stimulated their involvement in the class. This involvement has been found (Coates, 2010) to be important in the overall engagement of the student.

Table 3. Student engagement, cultures compared

Constructs and Questions	<i>Descriptive Analysis</i>			<i>t-tests</i>			
		<i>N</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>
Active Learning							
Using "lecture software" is helpful in reinforcing course concepts.	US	170	3.66	1.03	-1.382	328.809	.168
	SG	167	3.81	0.88			
I would recommend the use of "lecture software" in other classes within the hospitality college.	US	170	3.61	1.08	-1.930	331.723	.054
	SG	167	3.82	0.96			
Lecture software is easy to use.	US	170	3.95	1.01	-1.699	318.091	.090
	SG	167	4.12	0.78			
I felt more engaged in the class materials when using "lecture software".	US	170	3.56	1.21	-3.228	313.516	.001*
	SG	166	3.94	0.91			
I appreciate the anonymity of the "lecture software" process.	US	170	3.82	1.03	-3.769	313.908	.000*
	SG	167	4.19	0.78			
Lecture software encourages me participate in class.	US	170	3.57	1.10	-5.561	295.881	.000*
	SG	167	4.14	0.74			
Lecture software allows for a positive overall learning experience.	US	170	3.72	0.97	-2.952	314.856	.003*
	SG	166	3.99	0.73			
Knowledge							
Lecture software allows me to stay interested during class time.	US	170	3.46	1.08	-4.121	313.634	.000*
	SG	167	3.89	0.81			
Lecture software motivates me to be more prepared for class.	US	170	3.22	1.08	-2.763	320.251	.006*
	SG	167	3.51	0.85			
Lecture software allows me to focus on key knowledge areas in the class.	US	170	3.64	1.02	-2.420	314.605	.016*
	SG	167	3.88	0.78			
Lecture software enhances my learning in the course.	US	168	3.60	1.00	-2.636	316.454	.009*

Constructs and Questions	<i>Descriptive Analysis</i>			<i>t-tests</i>			
		<i>N</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>
Lecture software helps me to understand the subject matter compared to non-lecture tool classes.	SG	165	3.86	0.79			
	US	169	3.53	1.08	-2.543	316.416	.011*
Enjoyment	SG	166	3.80	0.84			
	US	169	3.64	1.03	-3.148	312.807	.002*
Lecture software helps make the learning experience more enjoyable.	SG	166	3.95	0.78			
	US	169	3.49	1.04	-4.121	319.176	.000*
Using "lecture software" in class makes the material more interesting.	SG	165	3.92	0.83			
	US	169	3.57	1.08	-3.718	321.762	.000*
Lecture software makes the class more enjoyable compared to traditional classes.	SG	165	3.98	0.88			
	US	169	3.57	1.08	-3.718	321.762	.000*
Involvement	SG	165	3.98	0.88			
	US	170	3.77	0.94	-2.521	323.478	.012*
When the instructor incorporates a discussion around the "lecture software" question, I find that valuable.	SG	167	4.01	0.76			
	US	170	3.49	1.11	-4.682	317.583	.000*
I believe that I am more actively engaged in the class lectures because of "lecture software."	SG	164	4.00	0.86			
	US	169	3.88	0.86	0.091	333	.928
Finding out the correct answer to the "lecture software" question is important to me. ^a	SG	166	3.87	0.81			
	US	170	3.61	1.07	-4.454	320.352	.000*
Using "lecture software" helps liven up the lecture.	SG	167	4.08	0.84			
	US	169	3.57	1.03	-3.241	315.290	.001*
I would recommend that others take a hospitality class using "lecture software".	SG	167	3.89	0.79			
	US	169	3.57	1.03	-3.241	315.290	.001*

Notes: ^a = Equal variances assumed for all skills. All others equal variances not assumed. *p<.05.

The common thread for hospitality students with regards to lecture software was in the construct of active learning and indicated that students in both locations do enjoy when instructors include interactivity into the design of the hospitality class. In addition, students in both locations did like when lecture software is used in a class and that they were immediately able to see the answers from their peers in real time. The majority of questions showed that each location does differ: students located in Singapore were more engaged when the instructor used lecture software.

Discussion

The results showed that there was overall satisfaction of both hospitality students in the U. S. and Singapore with instructional technology or in the case of this study lecture software. The Hospitality Learners Model (Green & Sammons, 2014) proposed that active learning is a component of both instructional design and technology. This study confirmed the importance as far as the students are concerned about active learning and technology used in the classroom.

The instructors that were involved in the study were asked to list both strengths and weaknesses of using lecture software in their classrooms. Most of the weaknesses were about the lecture software and not the class issues. One faculty member felt the conversations in class were not as free flowing as normal. The weaknesses included:

- “Lecture software was clunky”,
- “Felt like it stifled conversation as the students were typing, not listening or speaking within class”,
- “Raised hand did not work instantaneously, unlike clickers. Had to refresh screen”,
- “No animation”, and
- “Polling was delayed.”

Some of the strengths the faculty described included:

- “The software was intuitive and simple to use”,
- “Raised hand – allowed the student to be noticed (this faculty member used the computer and projector for the classroom and an iPad as they walked around the classroom so they could refresh frequently)”,
- “Liked the notes feature for the students”,
- “Liked the ability to draw on the screen to accentuate important points being presented”,
- “Integration of video is seamless”, and
- “Lecture software allowed polling questions to have more than one answer. Great for talking points!”

The six instructors that were involved in the study taught different courses: Hospitality Accounting, Hospitality Finance, Human Resources, and Organizational Behavior. Four of the six instructors reported they would continue to use lecture software if it was adopted at their school.

Each of the constructs was found to be significant. Drilling down to each question found that when asked, students really did like to engage in active learning. This is the same with other studies that find active learning leads to student engagement (Oigara & Keengwe, 2013; Sternberger, 2012). It is the role of active learning in the classroom and the design of active learning within the class that is essential. Instructors, who can incorporate this practice, can then also incorporate the technology as part of the design into active learning. It then stands to reason it is not the actual technology, the device that leads to active learning. This study highlighted the steps needed to create an active lecture which in turn, the students were active in the classroom.

For the most part, the students in Singapore enjoyed the lecture software more than those students in the U. S., which lends nicely to the idea of a paradigm shift. Educators should work to incorporate more active learning in classes situated in Singapore, thus generalized to Southeast Asia. This implies that these students of the 21st century are moving toward the notion of enjoying a lecture where the instructor delivers the materials in a different way through technology. The results suggest this should urge educators to incorporate technology into the active design of their class, both in Southeast Asia and the United States.

Limitations and Future Research

There were some limitations to this study. The first limitation was with having five instructors in the U. S. deliver the materials, and only one in Singapore. The faculty at the campus in Singapore was much smaller, and it was difficult to find instructors that had command of instructional technology. The second limitation was that all of the classes were different. It would have been a stronger study if the same instructor, delivered the same materials to both the classes in the U. S. and Singapore. And finally, the study window was short, it would have been better to do an entire semester with the lecture software and then capture the data.

The future of technology in the classroom is inevitable, in the U. S. and around the globe. Suggestions for research could include learning outcomes specifically linked to grades, improvement, and technology. It would be of interest to also to see if instructors whom adopt technology have better learning outcomes compared with those instructors that deliver the material without the technology. As technology changes, so will the opportunity to incorporate the changes into the classroom and measure the outcomes.

Technology Across Cultures

One outcome of the study showed that by incorporating technology into the lecture, there were better outcomes in active learning, knowledge, involvement, and enjoyment constructions. It is not all about how to use the technology, but how to design the usage in the classroom with the integration of the technology. We can properly integrate lecture software and clickers into the class with the following design recommendations:

- Set clear objectives before beginning class lecture.
- After asking questions of the class and receiving live feedback, discuss the responses with students. Each question should tie to a class objective.
- Rather than asking rote memorization, objective-style questions and moving on, ask a polling question, as a precursor to a class discussion or group activity.
- The instructor should remain a facilitator who guides the delivery of the content.
- The content should remain learner-centered, rather than teacher-centered.

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