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Felder-Silverman Model: International Comparison Application Post COVID

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ABSTRACT

Understanding what learning style preferences exist in international business classrooms is important for the overall design of learning objectives and learning outcomes in business education. This is especially important as 94% of the global learner population moved online in the wake of the COVID-19 pandemic, including the majority of business learners. The study used the Felder-Silverman Model of learning styles to investigate business learners in a hospitality discipline in the United States (n = 365) and in Singapore (n = 154). Findings revealed that two learning styles of business learners were significantly different between the two data sets. The results of this study contribute to the understanding of learning preferences of business students and how learning styles across these two cultures may assist instructors in the overall design of their international business classes.

JEL Classification: Z39

Keywords: business education, learning styles, international business education, Felder-Silverman, post COVID

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I. INTRODUCTION

The COVID -19 global pandemic brought together higher education in a unique way. At a moment's notice, most of higher education moved to online learning platforms. Online education has been prevalent since the late 1900s in the U.S. Distance education is where technology is used for teaching and learning while the instructor and learners are physically separated (Sewart et al., 2020). Over the last two decades, online delivery in all forms (synchronous or asynchronous, fully online or hybrid, etc.) has been seen as an alternative to the traditional face-to-face classrooms (Heo et al., 2021). The extreme shift to online learning during COVID-19 forced instructors to stretch their experiences with platforms including Canvas, Blackboard, Moodle, and other instructional technologies (Al-Freih, 2021). In this massive shift, even the most experienced online instructors had to take time to rethink how to incorporate strategies to engage, be accessible, and encourage all types of learning styles. At the same time, the learners also made a shift to online learning, which changed their perception and expectations of distance education. The COVID-19 disruption has put online education in the spotlight and has allowed instructors to reflect on content delivery and how best to reach learners (Bozkurt et al., 2020). However, not all have the same learning style preferences, when looking at global business education it is essential to consider different learning styles across cultures. Specifically, business education is an important topic to study, with the aim of making improvements at both the academic and organizational levels (Aguilera-Herminda et al., 2021). As Alstete and Beutell (2020) state, this area synthesizes understandings of learning styles and teaching strategies for learner engagement. This importance has been further magnified by the COVID-19 pandemic and the impetus to move more courses online in the interest of public health.

There have been myriad learning style studies in higher education (e.g., Hsu, 1999; Lee & Kamp, 2005; Lashley and Barron, 2006; Green and Sammons, 2014; Farashahi and Tajeddin, 2018; El-Bishouty et al., 2019). Although learning style research is not new, Baker and Unni (2018) suggest that the focus has been on Western learners rather than including learners from across the globe. Most of the studies have looked at learning styles from two geographic locations: the U.S. and Europe. Although this has added to the body of research previously, with the COVID-19 pandemic forcing learners across the globe into online learning modalities, it is essential to understand learning styles of different cultures and then apply the results to current times. Studies can approach from an educational/instructional system designer's view or an instructor's view. It is essential to assess different groups of learners and understand the "culture-based learning styles within the group[s]" (Gunawardena et al., 2003), then to apply this to the design of online courses. How learners prefer to learn is essential when determining how to deliver educational materials (Hsu, 1999).

Several different models – Honey and Mumford (1983), Kolb's Learning Style Inventory (1984), the Myers-Briggs Type Indicator (1980), and the Felder-Silverman (1988) Index of Learning Styles (ILS) – all have been used to determine learning styles. In disciplines that are considered "applied" such as business and hospitality, Kolb's model has been used predominantly over the last two decades (Lin et al., 2018) and has added to the sparse body of literature for learning styles in business schools at the higher education level.

Learning styles and the instruments have been debated for decades in education

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(Rohrer and Pashler, 2012). The idea that teaching according to styles, has been at times challenged and viewed as a mismatch between a theory and practice. Online learning was also at one time viewed as not being the same as face-to-face quality and effectiveness (Singh, et.al., 2022). These mindsets would come to an abrupt shift when the world went to online course delivery, and soon after, instructors incorporated tools such as learning styles to help deliver the course materials to be inclusive.

The purpose of this study was a) to compare learning styles of business learners in Southeast Asia (Singapore) and learners from the United States, and b) to apply the findings to COVID-19 and post-pandemic online learning platforms.

II. LITERATURE REVIEW

Research on learning styles has been researched and reported across the globe. However, there has been very little comparison between different cultures with regards to learning styles between Southeast Asia and the U.S. in business education (Charlesworth, 2008; Marambe et al., 2012; Boyle et al., 2020). The meaning of *culture* in education has been difficult to formally define (Gunawardena et al., 2003). To investigate culture within learning, it is best to look at cultural influences (inside and outside of education) and the educational approaches (past and present) used to help shape the understanding of how learners learn. Both Southeast Asia and the U.S. have excellent educational resources but may differ in cultures and educational approaches that define higher education. They also differ on specific tactics in response to the COVID-19 pandemic, although both obviously share a common interest in protecting their respective citizens from the public health crisis.

A. Educational Approaches in the United States

Learners bring different sets of values to the classroom, which is often reflective of their culture. Over the last 100 years, theories, and models of how learners in American colleges and universities learn best have been a central area of study (Merriam, 2001). One theory that has gained popularity over the last 50 years is that of Andragogy (Knowles, 1968), which focuses on the adult learner versus the "pre-adult"x or child learner. Additional learning theories in business education include experiential learning, peer-to-peer learning, and active learning (Farashahi and Tajeddin, 2018). As Andres and Akan (2015) suggest, learners in the United States tend to lean towards interactive learning environments.

Experiential learning is a process in which learners learn through experiences outside the physical classroom (Kolb, 1984). This can be by way of internships, travel, or other methods which promote hands-on learning. Peer learning occurs when learners learn from each other by way of group interaction (Crouch and Mazur, 2001; Mosteanu, 2021). An example of this is when, after a question is raised by a learner, the instructor solicits discussion and group exchange on the topic at hand from the rest of the class. Suggested by Deale (2019), learners in business education programs tend to prefer active learning and did not care for the "sage on stage" type of class lectures. Active learning encourages learners to participate in activities – individual or group – within a classroom setting (Rezaei, 2022). Although there are many different theories, a common thread is that Andragogy and collaboration, either by groupwork or peer-to-peer interaction, are

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woven throughout each sector of U.S. education (Knowles, 1968).

B. Educational Approaches in Southeast Asia

Culture has become a significant focus in research on global education strategies. In the East, Confucianism blends both secular and ethical mindfulness, and this perspective is prominent in many Asian countries (Barron and Arcodia, 2002). This also has a direct effect on how learners are raised culturally, which is different from U.S. culture, yet close enough to allow Asian learners to be aware of "philosophical, pedagogical, and political achievements in the West" (Barron and Arcodia, 2002). Unique to the Confucian approach is the idea that education is seen as available to all social classes, and the instructor is the "face" or role model (Stowe and Clinebell, 2015). In addition, some social norms may include not asking questions in class as a way of demonstrating respect for the knowledge and instruction of the teacher (Huang, 2005).

There are generalities within any group, and Southeast Asian learners as a demographic have been reported to be introverted, studious, and most amenable to lecture-type classes (Barron, 2004). They also tend to excel in learning through memorization (Cortazzi and Jin, 1997). Anecdotal research seems to indicate that Southeast Asian learners enjoy rote memorization, which is not necessarily equivalent to hands-on learning (Liu and Littlewood, 1997). However, there is research to suggest that this learning approach is considered out of date (Kennedy, 2002).

C. Learning Styles

Over the years, there have been different interpretations of learning styles. Most interpretations are rooted in cognitive psychology, in that the process function of content is the outcome of the preference (Peters et al., 2008; LaFever 2010). There are many factors involved with interpretation, such as understanding the learning environment, teaching styles, and learning strategies (Lashley and Barron, 2006). Differences between perspectives usually hinge on understanding student learning styles, and then building the objectives around the stated learning outcomes.

Learning style assessments can be used in both education and organizational learning (Liu, 2007). The results of these assessments can assist in adapting instructional strategies when designing curricula that are compatible with student learning styles. Although the first research on learning styles can be traced back more than four decades, most research in this area has occurred in the past thirty years (Cassidy, 2004). While the intensity has varied over time, during the last decade there has been an uptick in the number of researchers and publications on this subject (Cassidy, 2004). Specific research topics include variables around motivation, perception, and self-efficacy (Costa et al., 2020), which are all building blocks of learning. As awareness of business education programs has come to the fore, so too has the focus on how learners learn best (Lashey and Barron, 2006).

Graf and Kinshuk (2007) articulated learners can learn more effectively when the instructor brings various learning styles into consideration. Educational theorists consider learning styles to be an important factor in how learners learn. Theorists see learners as a vital part of the facilitation process (Lwande et al., 2021). Additionally, other studies have focused on matching learning styles with teaching styles, or vice versa (Gatewood

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et al., 2022). A correlation between individual styles and group dynamics in the learning environment is important with respect to instruction strategy (Siddiquei and Khalid, 2021). Learning styles can be defined from a learner perspective as an individual's attitude towards their own learning (Honey and Mumford, 1992). Several models of learning styles have emerged over the last four decades and each purport to measure learning in different ways (Deale, 2019). The most prominent instruments used in business education to measure learning styles are those developed by Kolb (1984) and Felder – Silverman (1988).

Kolb's (1984) Experiential Learning Theory uses a four-quadrant model to map learner preferences. The categories include style types such as accommodators, convergers, divergers, and assimilators (Karns, 2006). Once the mapping is completed, the output is in the form of strengths; an instructor can then design the class to provide the learner with appropriate material and activities for deeper learning (Graf and Kinshuk, 2007). Kolb's model is used both in education and in organizations; learning styles can help instructional designers capture different methods of delivering instruction (Liu, 2007).

Felder and Silverman (1988) created an index that maps learners into four dimensions by learning style or preference. After Felder and Silverman analyzed the initial instrument in 1991, the factors that did not fit were discarded, and the factors that did fit were saved into the instrument we use today (Felder and Spurlin, 2005). The four dimensions include active – reflective, sensing-intuitive, visual-verbal, and sequential – global. And they are illustrated in Table 1. Each grouping offers insight into what learners prefer for perceptual mode and information attributes. The instrument was first used to measure learners in the education field. Since the instrument was created, the Felder and Silverman ILS model has been implemented outside of the U.S. and has been translated into several different languages (Genovese, 2004). The ILS outcomes suggest that one learning style is not preferable over another. Rather, it is individual in nature to understand how people prefer to learn, and everyone has a different style that works best for them (Felder and Brent, 2005).

Table 1
Examples of ILS 4 Dimensions

-11 ◄——————————————————————► 11	
Active	**Reflective**
Learners like to "try" things out, work in teams and small groups.	Think things out - tend to work alone or work better with a known team member.
Sensing	**Intuitive**
Learn facts and solve problems. Like facts presented and are concrete thinkers.	Learn from concepts and theories. Tend to be innovative
Visual	**Verbal**
Learn from pictures, charts and graphs.	Remember by words.
Sequential	**Global**
Learn in a step-to-step fashion, concepts are in small, achievable chunks.	See things in the larger picture, as a whole, grasp large concepts.

D. Impact of the COVID-19 Pandemic

The global COVID-19 pandemic that emerged in 2020 fundamentally altered virtually

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every aspect of daily human activity. The public health crisis demanded significant changes to normal routines, including quarantining and limiting in-person and face-to-face contact to the extent possible in order to abate transmission of the deadly virus. For the higher education industry, COVID-19 represented a major impetus to move courses of all disciplines and levels to an online modality, so as to eliminate a potential source of exposure to the virus. Prior research has solidly established that learning styles are of particular importance in online learning environments (Diep et al., 2019). So, the effect of the coronavirus on this subject was simply to magnify the importance of researching and understanding the dynamics of learning styles around the world.

The purpose of this study was to address the following questions:

1. Are there any differences in learning style trends between business education learners in Southeast Asia versus the United States?
2. How do each of the learning style dimensions compare between learners in Southeast Asia and learners in the United States?

III. METHODOLOGY

A. Population and Data Collection

Learners from a large public university with one campus in the U.S. and one in Singapore were asked to complete the ILS instrument. Over a four-semester period, data was collected from Introduction to Hospitality, Human Resources, and Leadership/ Management courses as presented in Table 2. A total of over 830 learners were recruited to participate in the study. Recruitment was accomplished by sending emails to course professors with a web link for the research survey. Participating professors then shared the link with their learners via email, face to face and/or via the school's online learning management system. A total of 602 participants responded, with 529 usable surveys. Data were collected from undergraduate classes in Singapore (n = 164), and from the United States (n = 365). The classes selected to participate in the study are all required and are part of the core curriculum. Participation in the study (i.e., completion of the survey) was completely voluntary and anonymous. No personally identifiable data was collected, and no reward or coercion were offered or threatened (respectively) in association with participation.

Table 2
Data Sets and Collection

	Semester/ Year	n	Location
Introduction to Hospitality	Fall 2013	131	U.S.
Human Resources	Fall 2012	143	U.S.
	Spring 2013	75	U.S.
	Summer 2013	16	U.S.
Leadership/ Management	Summer 2013	164	Singapore

n =529

B. Research Instrument

The Felder-Silverman (1988) instrument was selected to measure learning styles in this

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study. The Felder-Silverman learning style model was first designed to investigate the learning styles of engineering learners (Ultanir et al., 2012). The initial version of the ILS was tested in 1991 and has been further refined over the years (Felder and Spurlin, 2005) for reliability and validity – all metrics for the current instrument are well within acceptable levels. Additionally, performance of the ILS in test-retest reliability assessments has been satisfactory as well (Felder and Spulin, 2005). The ILS has a total of 44 forced choice questions, with either "a" or "b" as response options. Each of the four dimensions is measured by 11 questions, and so performance on each dimension is reported in a value from 11 "a" answer to 11 "b" answers (or -11 to +11); as such, it is considered a continuous variable. In addition to the instrument of 44 questions, there were additional demographic questions asked.

C. Data Analysis

The online survey collected the data for the 44 ILS questions in the format of "a" or "b" answers. The raw data was downloaded into an Excel spreadsheet to determine each learning style dimension. The data were scrubbed and coded to represent the "a" or "b" with the numbers "0" and "1". Once the individual dimensions were determined, the data were then imported into SPSS for further analysis. The analysis looked further into the overall outcomes of the learners, once the high-level analysis was completed, descriptive statistics and t-tests were calculated. These were then analysed for each learning style dimension, and further detailed into each campus being evaluated.

IV. RESULTS

Of the 529 participants, the demographic data indicated that about 60% of the respondents were female, and 82% of the respondents were of "traditional" learner age between 18 and 24. For both the United States campus and the Singapore campus, the mean outcome for each dimension landed in the negative number area, between -.5 and -11. as illustrated in Figure 1.

The learners in Singapore indicated strong preferences (between -3 and -11) for active (39%), sensing (59%), visual (84%), and sequential (34%) styles. Learners in the United States showed strong preferences for active (43%), sensing (57%), visual (67%), and sequential (47%). A comparison of each dimension, per location, per mean, on the continuum is illustrated in Figure 1. Further comparing each location by dimension reveals that there are differences across learners between the two regions. For example, findings indicate that there are significant differences in two of the learning styles: visual-verbal and sequential-global.

A. T-tests

Two learning styles that showed significant differences at the .05 level are illustrated in Table 3. The first significant finding is the visual-verbal style, where learners from Singapore ($t = 4.11$, $p = .000$) appear to have a higher preference for visual learning. The second significant difference was the sequential – global ($t = -3.54$, $p = .000$) preference, where learners from the United States appear to have a higher preference for the sequential learning style. The two other learning styles – active-reflective and sensing-

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intuitive – did not show significant differences.

Figure 1
Cross-Cultural Comparisons by Learning Style

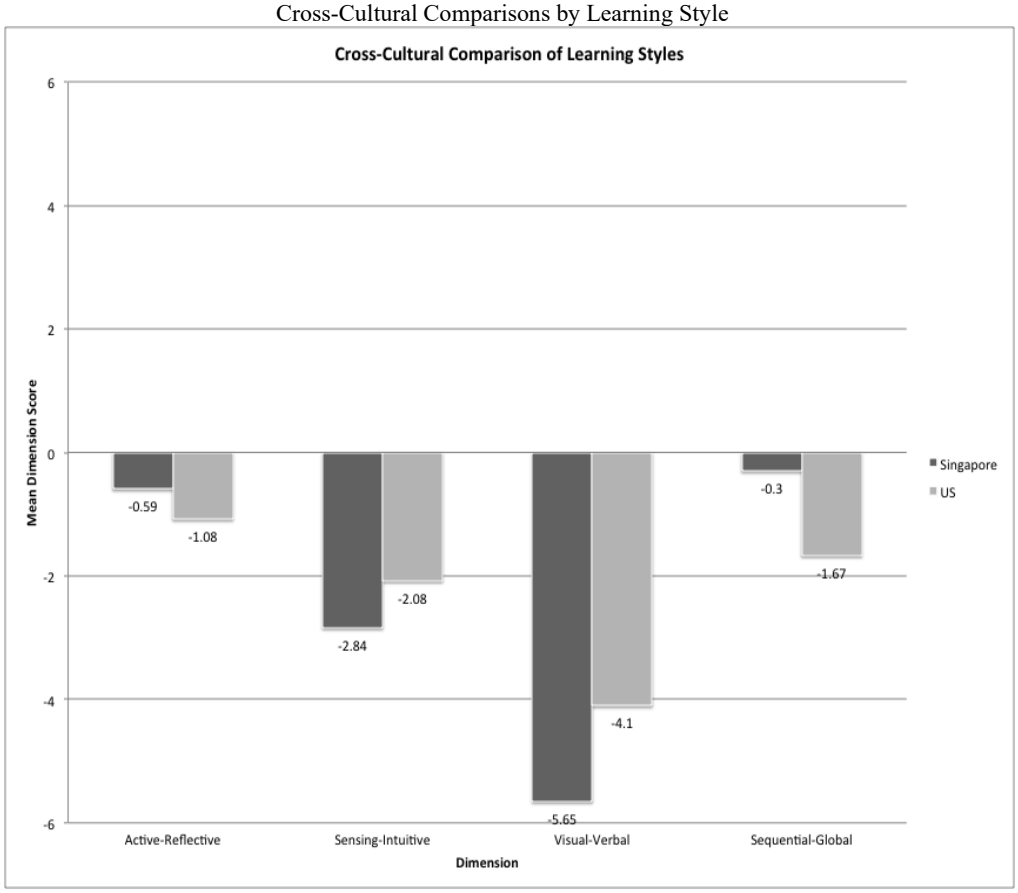

Table 3
Means, T-tests, Significance

		N	Mean	SD	t	df	Sig.
Active - Reflective[a]	United States	365	-1.08	4.80	-1.217	369.217	.224
	Singapore	164	-0.59	4.04			
Sensing - Intuitive	United States	365	-2.08	5.02	1.61	527	.108
	Singapore	164	-2.84	4.92			
Visual - Verbal[a]	United States	365	-4.10	4.67	4.11	391.222	.000*
	Singapore	164	-5.65	3.69			
Sequential - Global	United States	365	-1.67	4.05	-3.54	527	.000*
	Singapore	164	-0.30	4.22			

Note: Equal variances assumed for all skills with superscript a. All others equal variances not assumed.
*p<.05

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B. Mean Scores Across Styles

1. Active – Reflective Dimension

As for results from the first dimension (active – reflective), participants in the study as a whole preferred active learning. Participants in the United States had a slightly stronger preference for active learning (M = -1.08, SD = 4.80) than participants in Singapore (M = .-59, SD = 4.03). An example of an active class would be an assignment that requires learners to work in small groups. Although active learning is seen as a preference in both Singapore and the United States, some learners also preferred the reflective style. Reflective classroom techniques might include journaling or individual thought exercises.

2. Sensing – Intuitive Dimension

Singaporean learners showed a stronger preference for the sensing style (M = -2.84, SD = 4.92) compared to the United States learners (M = -2.08, SD = 5.02). In both cases, it appears to fall in the middle of the continuum. For this outcome, both sets of data would ostensibly enjoy a lecture set in the "real world" followed by examples outside of a textbook. When designing a class for a "sensing" learner, case studies would be good to bridge theory to reality. Although the results show a preference for sensing, Felder and Silverman (1998) suggest that even learners who usually prefer sensing may at times may be intuitive as well.

3. Visual – Verbal Dimension

By far, the strongest number on the continuum is the preference towards a visual style as indicated by the results (M = -5.65, SD = 3.69). This trend was stronger in the learners from Singapore than the learners from the United States (M = -4.10, SD = 4.67). Although the overall finding is likely unsurprising to educators (i.e., learners learn better from visual cues), the preference for the Singaporean learners is much greater. Oddly enough, the fact is that most higher education institutions in both Southeast Asia and the U.S. offer traditional lectures by "sage on stage" or verbally delivering the information. In the classroom, visual learners like materials to be delivered through charts, photos, and videos. As with the other dimensions, striking a balance for the learner is key between visual and verbal preferences.

4. Sequential – Global Dimension

Results also indicated that there was a stronger preference for sequential learning from United States learners (M = -1.67, SD = 4.05) than from Singaporean learners (M = -.30, SD = 4.22). This indicates that the learners in the United States would ostensibly prefer to be given information in a linear way slightly more than those learners in Singapore. However, both would do well with having a balance of linear delivery as well as global delivery.

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V. CONCLUSION

A. Application Post Pandemic

The results of this study can now be used to inform how we move forward post-pandemic and create a learning process which supports both the educators and the learners (Yurdal et al., 2021). Now allowing for a shift in perspective, the results of this study echo that educators have the opportunity to apply the knowledge of learning styles for all learners online or face-to-face (Andres and Akan, 2015).

The purpose of this study was to explore the learning style preferences between learners in the United States and Southeast Asia (Singapore) using the ILS instrument to determine if there were any significant differences. The overall outcomes from the analyses show that the visual-verbal dimension was the most pronounced for both data sets. The respondents in the study indicated a strong preference for the visual learning style across the locations, which is a similar outcome to other learning style studies (Cranage et al., 2006; Green and Sammons, 2014). Further, it is the learners from Singapore that have a stronger preference for visual learning.

Although most educators intuitively understand the visual learning preference, this study adds empirical data to support such intuitions. Thus, it is important for educators and instructional designers across the globe to design courses on all learning platforms with this preference in mind. Including a focus on visual preferences and using visual cues such as photos, videos, charts, and interactive web pages. Despite the visual learning preference, we as educators still embrace the teacher-centered lecture and are not incorporating strategies to engage learners online. If incorporating more visual techniques is a direct link to student learning propensity, then this is an obvious opportunity for improvement across all delivery modalities.

Understanding learner dynamics is critical in the 21st century learning space. Learners today are now rightfully described as "digital natives;" they have been immersed in technology all of their lives, and for that reason they tend to respond well to highly visual styles of learning. In addition to more traditional visual media, simulations and gaming can also be included in visual strategies as well. Allowing tools in the classroom, such as tablets, computers, and smartphones, can aid in visual preference design.

The results of the statistical analysis also show that, in addition to the visual preference, sequential styles proved to be significant as well. Learners from the U.S. were stronger in the sequential style on the sequential-global dimension. This in itself is an interesting finding, which goes against the lecture only, teacher-centered styles that are in ubiquitous use around the world.

The outcomes of this study support the importance of this subject, especially with respect to online learning modalities and the way in which the COVID-19 pandemic has moved many higher education offerings to the web. Specific to business education, where the goal is to teach future leaders about the business industry, the common thread is that learners who graduate and move into management positions are often evaluated on the output of soft skills. Educators would do well to align their classroom design with learning styles, so learners are optimally prepared when they get into the industry.

As the workforce becomes global, it is important to be inclusive in business education and incorporate global perspectives. Currently, international programs and

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distance education are reflective of the importance of global education. For this reason, it is essential to study not only the curriculum that exists, but also the learners who occupy the learning space. One of many tools that can be used to help identify learner preferences is the ILS. Instructors and course designers can use this to craft a class that has more appeal to learners. Although the results show preferences from both data sets on different sides of the dimensions, it is essential that all learning styles be incorporated (Hsu, 2011) in order to increase benefits across business education. The key to instructional design across cultures is to strike a balance of learning styles, materials, and assignments (Tung, 2021).

One dimension not statistically significant in the study, but nonetheless of interest due to the COVID-19 pandemic and current trends in education, is the active-reflective preference. The data sets did not show a particularly strong preference here either way. However, both sets did indicate they enjoy an active style of learning. Learners in active classroom environments have the opportunity to collaborate in small or large groups in order to problem solve and synthesize. Active learning is learner-centered, where the instructor focuses on the learning outcomes and not simply the delivery of materials. Collaboration is key in this learning environment, and this philosophy is in line with learning strategy at the organizational level, in the sense that it prepares learners to enter the workforce with an understanding of how to work and learn collaboratively. In the wake of COVID-19, many education programs have been forced to move online and it is decidedly more difficult to create an "active" classroom environment on the internet, where learners do not have the benefit of face-to-face contact. However, active collaboration is still possible – it simply requires that instructors be more creative (Pokhrel and Chhetri, 2021). For example, technological tools like web conferencing can facilitate groups and group work, if structured efficiently.

The key to understanding the results of learning styles is to empower the learner to understand what it means with regard to their personal learning style and how to best use the information. Understanding learning styles can assist learners, not only with formal education, but also with regard to becoming lifelong learners. For example, if a learner prefers the sequential style (linear or step-by-step), and they enter the workforce to find their organization is training in a global style, the learner can then ask for assistance or support to better suit their learning predispositions. Of course, learning style preferences do not suggest that an individual can only learn one way. Rather, their aim is to sharpen the focus of learning tools so as to maximize efficacy and efficiency in the learning process.

It is important for those in academia to understand learning styles from a cross-cultural lens and to reach learners from diverse backgrounds (Sikkema and Sauerwein, 2015). Only after cultural background is understood can instructional designers be competently focused and honed. Applying cross-cultural knowledge and learning style proficiency to the higher education process yields benefits for all stakeholders, to include learners, teachers, institutions, and future employers.

Learning styles are indeed equally important to job-related learning and training. The current global workforce consists of a multi-generational body, with baby boomers exiting into retirement and younger generations developing into professional and leadership roles. Understanding the learning preferences of different generations (and across cultures) is important in the workplace (Cekada, 2012). Adapting training and development curriculum to the learning needs of learners in different locations and at

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different generational levels could be a challenge, understanding learning styles is essential to continuous growth and improvement (Urick, 2017).

B. Limitations and Future Research

This study surveyed learners from within one university, across two different campus locations, and as such a convenience sampling acknowledgement is appropriate. There is obvious consistency in the curriculum for all learner respondents and this could potentially limit the generalizability of this study's results. However, gathering data from different institutions in the future would be an opportunity to further explore this line of inquiry. Further testing is needed with different learners, from different schools, in different places, using different learning styles assessments. Another opportunity for future research might include comparing teaching styles across different countries as well. There is tremendous opportunity to expand this research, and this study is intended only as the preliminary step in understanding the dynamics of learning styles across different student demographics.

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