Chapter #1

HOW LEARNING STYLE RELATES TO STATE AND TRAIT ANXIETY AMONG JAPANESE FRESHMEN TRANSITIONING TO UNIVERSITY

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ABSTRACT
This study examined how learning style relates to anxiety among university freshmen, controlling for gender, during their academic transition from high school to university. The study applied Kolb's experiential learning theory and Spielberger's paradigm of state and trait anxiety. Participants consisted of 194 freshmen of a Japanese university located near Tokyo. Data were collected in a required course and analyzed using two-way analysis of variance (i.e., learning style and gender). Results revealed that the four learning styles significantly differed in both state and trait anxiety variables. However, there was an insignificant difference in both anxiety types between male and female students. Additionally, there was no interaction effect of learning style and gender for either type of anxiety. We offer practical implications based on the study findings.

Keywords: learning style, state anxiety, trait anxiety, academic transition, Japanese undergraduates.

1. INTRODUCTION

Freshmen encounter psychological challenges when beginning their university life (Basco & Olea, 2013; Clinciu, 2013; Pancer, Hunsberger, Pratt, & Alisat, 2000). One such challenge, student anxiety as a negative emotional experience derived from the unfamiliar university environment, leads to adverse consequences (Von Ah, Ebert, Ngamvitroj, Park, & Kang, 2004) such as poor academic adjustment and performance (Levitz & Noel, 1989; Saklofske, Austin, Mastoras, Beaton, & Osborne, 2012), mental and physical illness (Ribeiro et al., 2017), and even dropout (Clinciu, 2013). Research on efforts to alleviate freshman anxiety has reported the effectiveness of social support (Compas, Wagner, Slavin, & Vannatta, 1986; Sato et al., 2017), which includes institutional aids and school counselors. Although the effect of freshman anxiety as well as methods to reduce it have been investigated, little research has examined the relationship between freshman anxiety and individual differences—especially learning style. Using a sample of university students in Jordan, Kadiem and Hamzah (2004) documented the association of gender, personality, and trait-anxiety with learning styles, but their study did not highlight the context of transition to university. Based on studies performed by Spielberger (1972) and colleagues (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983; Vagg, Spielberger, & O'Hearns, 1980), state anxiety was also identified as a crucial construct that hinges more on environmental conditions. As a consequence of the limited research, it is still unknown whether there is a relationship between learning style and state as well as trait anxiety of university freshmen at a time when students experience the important transition from high school to university. The current study sought to fill this gap. Accordingly, the aim of this

study was to examine how learning style relates to state and trait anxiety in this group of freshmen encountering a transitional period when entering university.

The current study's context is Japan, where the college-going rate has been increasing over the past several decades and was 57.9% in 2018 (Education Career, 2019). One issue facing Japanese universities as well as students is dropout and repeating a grade in university (Tateishi & Ogata, 2016). Tateishi and Ogata (2016) stressed the high rate of dropout in male students who attend private universities—with this trend rising since the 1990s. The Japanese Ministry of Education, Culture, Sports, Science, and Technology (2014) reported that the reasons for dropout from higher education institutions in Japan include financial distress (20.4%), transferring to another university (15.4%), poor academic performance (14.5%), starting work (13.4%), illness (5.8%), and difficulty in university adaptation (4.4%). Similarly, the Japanese Institute for Labour Policy and Training (2015) listed reasons such as poor academic performance and uninteresting courses/ classes (42.3%), financial or home problems (17.6%), changing careers (14.8%), difficulty in university adaptation including poor human relationships (11.8%), and illness (11.8%). Among the reasons, poor academic performance and difficulty in university adaptation seem relevant to learning and learning style. Thus, it seemed appropriate to study learning style in the context of Japanese higher education.

2. LITERATURE REVIEW

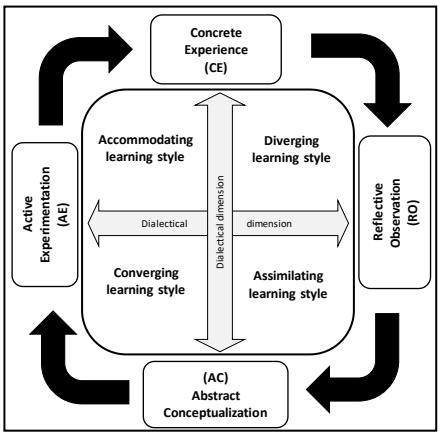
2.1. Learning style

Over several decades, learning style has been of interest to scholars and practitioners in multiple fields (Honigsfeld & Schiering, 2004). A large number of learning style studies have indicated that people have a distinctive way of learning (Dunn & Dunn, 1978; Kolb, 1984; Kolb & Kolb, 2017; Peterson, Rayner, & Armstrong, 2009). The term "learning style" refers to a person's preferred way of responding to tasks, assignments, or problems in a learning situation (Peterson et al., 2009). Keefe (1979) indicated that learning style is related to affection, cognition, and physiological activities in learning situations that require individuals to respond to their environment. In fact, various learning style paradigms have been offered, with different definitions of learning style (Hawk & Shah, 2007; Honigsfeld & Schiering, 2004). For instance, Dunn and Dunn (1978) explained learning style as individual cognitive activities when processing new and difficult information. Kolb (1984) proposed experiential learning theory through which learning style represents an individual's preferred way of approaching a learning situation based on his or her experience. Curry (1987) presented the onion model that contains different cognitive and learning styles, noting that learning styles in Kolb's theory correspond with the information processing paradigm (Cassidy, 2004), which calls for interacting between the person and the environment (Riding & Cheema, 1991). Later, Fleming (2001) presented the VARK learning style model, which represents visual, aural, read and write, and kinesthetic. His model deals with information by collecting it, putting it in order, and thinking. This study chose Kolb's (1984) learning model because it is based on individuals' experiences as a source of learning, and in this study the learning context involved freshmen experiencing an academic transition.

According to Kolb's (1984) model as shown in Figure 1, learning has four modes: concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE). Each learning mode has a specific function (Kolb, 1984). The CE mode relates to grasping concrete experiences, dealing with human situations, and using intuition. Individuals with this mode are good at valuing and respecting human

relationships. In contrast, individuals employing the AC mode are good at applying logic, conceptualizing theoretical models, and evaluating situations in an objective matter. They prefer accuracy and rigor when investigating thoughts. The RO mode relates to perceiving and making sense of situations through careful observation. Individuals with the RO mode are skillful at gathering information from different angles. Conversely, the AE mode involves acting, risk-taking, and initiative. Individuals with this learning mode are good at getting things done quickly.

Figure 1.
Kolb's learning style model.



In a process of learning based on Kolb's (1984) model, the CE mode requires catching immediate experience that becomes a basis of individual reflection using the RO mode. Then, when the RO mode requires transforming the experience as tacit knowledge into explicit knowledge, the AC mode requires using logic and abstract ideas that become foundation for the AE mode. Through transforming ideas, the AE mode requires acting and creating a new experience.

The CE learning mode is dialectically opposed to the AC mode in the grasping experience dimension, while the RO learning mode is dialectically contrasted with the AE mode in the transforming experience dimension (Kolb, 1984; Kolb & Kolb, 2017). A combination of two learning modes from each learning dimension creates four basic learning styles (Kolb, 1984). The Diverging learning style consists of the CE and RO modes and is characterized by the competencies of understanding people, having strong interpersonal relationships, and being imaginative and patient (Kolb, 1984). The Assimilating learning style, made up of the AC and RO modes, relates to the characteristics of making ideal plans, building theories and models, and viewing things from various perspectives (Kolb, 1984). The Converging learning style is composed of the AC and AE modes; it has the features of solving problems practically, making decisions, and establishing pragmatic goals (Kolb, 1984). Finally, the Accommodating learning style, with the CE and AE modes, is characterized by a trial-and-error approach, motivating and leading people, and making things happen (Kolb, 1984).

2.2. State and trait anxiety

Anxiety refers to an unpleasant emotion such as apprehension and worry (Kazdin, 2000). It is influenced by the sympathetic nervous system and feelings of tension (Kazdin, 2000). When people feel anxious, they may experience trembling, sweating, or a rapid heartbeat (Kazdin, 2000). However, it is difficult to comprehend anxiety as a phenomenon because anxiety has various dimensions. In addition, the term "anxiety" has been used to describe not only certain types of emotions but also diverse cognitive actions or processes (Spielberger, 2013). This is clear from the fact that psychologists have proposed numerous types of anxiety such as objective anxiety, neurotic anxiety, situation-specific anxiety, facilitative anxiety, and debilitative anxiety. Anxiety has been discussed as being elusive and intricate (Şimşek & Dörnyei, 2017), suggesting that it has multiple facets. Spielberger (2013) argued that anxiety is exhibited in two dimensions: state and trait anxiety. State anxiety involves a transitory excitement in a short-term condition based on a specific situation; thus, it is thought that the change of situation affects its occurrence. In this study, it was assumed that freshmen experience state anxiety during the academic transition from high school to university. Trait anxiety is characterized as a relatively stable and acquisitive attitude; thus, it is recognized as a personality trait. It tends to make people see a broad scope of safe conditions as dangerous (Nazerian, Zamani, & Soltani, 2011).

3. METHODS

3.1. Samples

This study was part of a project that explored multiple features of freshmen in a Japanese university located near Tokyo. To collect data for the study, one of the authors asked four instructors who taught a course required for freshmen in the management department to distribute paper-based surveys in their classes at the beginning of their first semester. There were 194 participants, 143 (74%) men and 51 (26%) women. Students' age for this study ranged from 18 to 20, with an average of 18.20 years (S.D. = 0.42).

3.2. Instruments

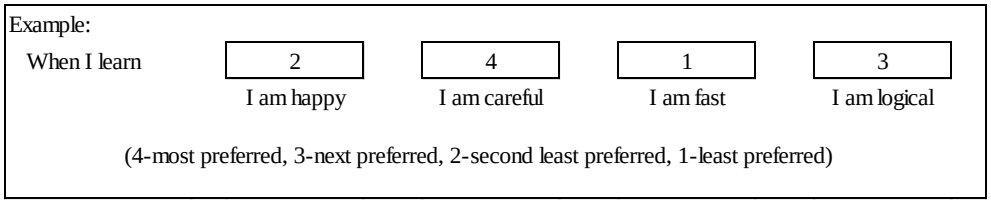
To examine state and trait anxiety, this study employed the State-Trait Anxiety Inventory (STAI) designed by Spielberger. STAI consists of 40 questions: 20 for state anxiety and 20 for trait anxiety. STAI questions have a 4-point Likert-type scale, ranging from 1, *not at all*, to 4, *very much so.* For this sample, the Cronbach's alpha was 0.86 for the STAI state scale and 0.84 for the STAI trait scale.

To identify individuals' learning style, multiple measures were provided according to various learning style models (Hawk & Shah, 2007). Hawk and Shah (2007) reviewed six well-known learning style measures: the Kolb Learning Style Inventory (Kolb, 1984, 1999), the Gregorc Style Delineator (Gregorc, 1985), the VARK Questionnaires (Fleming, 2001), the Index of Learning Styles (Felder & Silverman, 1988; Felder & Spurlin, 2005), the Productivity Environmental Preference Survey (Dunn & Dunn, 1989), and the Revised Approaches to Study Inventory (Entwistle, Hanley, & Hounsell, 1979). Since each learning model has its own definition of learning style, Hawk and Shah (2007) concluded that no one instrument can capture all the richness of the phenomenon of learning style.

This study used the third version of Kolb's (1999) Learning Style Inventory (LSI) to investigate freshmen's learning style. Research has shown that the third version has better psychometric properties than previous versions (Andreou, Papastavrou, Lemonidou, Mattheou, & Merkouris, 2015; Kayes, 2005). The LSI has been applied and supported

across numerous countries (Kolb & Kolb, 2017). Designed to investigate individuals' learning preference in a learning situation, it consists of 12 questions, each of which has four options corresponding with the four learning modes: concrete experience (CE), abstract conceptualization (AC), reflective observation (RO), and active experimentation (AE). Participants are required to rank statements in order from 4 *(most preferred)* to 1 *(least preferred);* thus, the LSI is designed with a forced-choice method. Figure 2 shows a sample question of the LSI. The total score of each of the four learning modes relates to the level of the participant's learning preference for the learning mode. Participants' learning styles are determined by subtracting one aggregated score from the other in the same dialectical learning dimension (i.e., CE vs. AC and RO vs. AE). The third version of the LSI has normative scores (the value of AC – CE = 4.30 and the value of AE – RO = 5.90) (Kolb, 1999) in order to determine participants' learning style.

Figure 2.
A sample question of Kolb's Learning Style Inventory (3rd version).



4. RESULTS

Before investigating the relationship between learning style and anxiety, we examined to what extent university freshmen experienced anxiety when starting university life. The mean score of state anxiety was 2.31 (S.D. = 0.46) and that of trait anxiety was 2.53 (S.D. = 0.45). Since this scale ranges from 1 (least anxiety) to 4 (most anxiety), the group of Japanese freshmen as a whole felt relatively anxious, probably related to their life transition. We divided the students into three groups: low anxiety (a score of 1 to 2), mid anxiety (>2 to 3), and high anxiety (>3 to 4). For state anxiety, 49 students (25%) were in the low group, 128 (66%) in the mid group, and 17 (9%) in the high group. For trait anxiety, 24 (12%) were in the low group, 141 (73%) in the mid group, and 29 (15%) in the high group. Thus, most students fell into a mid-range group for both types of anxiety.

In terms of learning style distribution in this sample, 71 students had an Accommodating learning style (37%); 69, Diverging (36%); 41, Assimilating (21%); and 13, Converging (8%). Accordingly, as a whole, Japanese freshmen exhibited a preference for a feeling (CE) rather than a thinking (AC) learning orientation. Most Japanese freshmen had an Accommodating or Diverging learning style, which is consistent with past learning style study results using undergraduate participants (Toyama & Yamazaki, 2018; Yamazaki, Toyama, & Attrapreyangkul, 2018). This tendency seems to be characteristic of Japanese culture (Yamazaki, 2005).

This study controlled for the demographic characteristic of gender because some studies have shown that learning style relates to gender (Philbin, Meier, Huffman, & Boverie, 1995). The issue is inconclusive, however, since others have documented no learning style difference in gender (Demirbas & Demirkan, 2007). To analyze how freshmen's learning style related to their state and trait anxiety, this study used two-way analysis of variance (i.e., learning style and gender) by controlling gender.

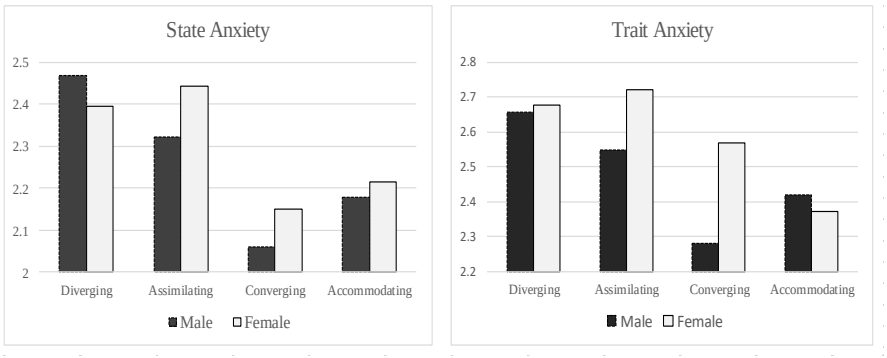
Results of two-way analysis of variance illustrated significant differences among the four learning styles in terms of state anxiety ($F = 3.38$, $p < 0.05$) and trait anxiety ($F = 4.07$, $p < 0.01$); however, gender did not have a significant relationship with the two anxiety variables (state: $F = 0.22$, $p > 0.05$; trait: $F = 1.38$, $p > 0.05$). Additionally, there was no interaction effect of learning style and gender in terms of anxiety. Based on the Tukey post hoc test, the Diverging learning style had a significantly higher level of state anxiety than the Accommodating style ($p < 0.01$) and Converging style ($p < 0.05$). Also, the Diverging style had a significantly higher level of trait anxiety than the Accommodating style ($p < 0.01$) and a marginally higher level than the Converging style ($p < 0.10$). These results indicated that regardless of gender, freshmen with a Diverging learning style, compared with other learning styles, were likely to have the highest level of state and trait anxiety during their academic transition. Furthermore, freshmen who preferred to learn through active experimentation (AE), which represents the common learning mode of the Converging and Accommodating styles, tended to exhibit a lower level of state and trait anxiety when beginning their university studies. To wit, students who learn by doing experienced less state and trait anxiety than those who learn by reflection. Table 1 summarizes results of two-way analysis of variance and the Tukey post hoc test, and Figure 3 shows state and trait anxiety levels according to learning style and gender.

Table 1.
Results of two-way analysis of variance with the Tukey test.

		State anxiety						Trait anxiety					
Source		*SS*	*df*	*MS*	*F*	η^2		*SS*	*df*	*MS*	*F*	η^2	
Learning style		2.02	3	0.67	3.38*	0.05		2.39	3	0.80	4.07**	0.06	
Gender		0.04	1	0.04	0.22	0.00		0.27	1	0.27	1.38	0.01	
Learning style x Gender		0.22	3	0.07	0.37	0.01		0.39	3	0.13	0.67	0.01	
				Mean Differences						Mean Differences			
Learning style group	n	Mean	*SD*	1	2	3	4	Mean	*SD*	1	2	3	4
1.Diverging	69	2.45	0.43	0.00				2.66	0.39	0.00			
2. Assimilating	41	2.36	0.41	0.09	0.00			2.60	0.46	0.06	0.00		
3. Converging	13	2.08	0.41	0.37*	0.28	0.00		2.35	0.39	0.32†	0.25	0.00	
4. Accommodating	71	2.19	0.47	0.26**	0.17	-0.11	0.00	2.41	0.48	0.26*	0.19	-0.06	0.00
				Mean Differences						Mean Differences			
Gender group	n	Mean	*SD*	1	2			Mean	*SD*	1	2		
1. Male	143	2.30	0.47	0.00				2.52	0.46	0.00			
2. Female	51	2.33	0.42	0.03	0.00			2.58	0.42	0.06	0.00		

** $p < 0.01$, * $p < 0.05$, † $p < 0.10$.

Figure 3.
State and trait anxiety levels according to learning style and gender.



5. DISCUSSION

This study showed a significant relationship between learning style and state-trait anxiety among university freshmen. Although several previous studies on learning style did not focus on freshmen (Ayalp & Özdemir, 2016; Kadiem & Hamzah, 2004; Yazıcı, 2017), their results are partly congruent with our results. For example, Ayalp and Özdemir (2016) reported a significant association between learning style and test anxiety using a sample from Turkish universities. More specifically, Turkish students with a Diverging learning style had a higher level of test anxiety than those with a Converging learning style. The other two studies applied different measures for learning style, which do not allow for direct comparisons. However, it should be noted that they showed that learning style was relevant to trait anxiety (Kadiem & Hamzah, 2004) and text anxiety (Yazıcı, 2017).

An interesting question is raised in terms of why the Diverging learning style relates to a higher level of state and trait anxiety. As those who learn through a Diverging learning style use the two modes of concrete experience (CE) and reflective observation (RO), they are sensitive to their internal and external environments. If they face a situational, unfamiliar problem, they may find it challenging to quickly resolve the problem or make decisions to cope with it. These activities require action rather than reflection. Thus, characteristics of learning style seem to be related to the anxiety. Furthermore, the learning tendencies of the Diverging learning style may hinder self-confidence development, which is thought to reduce anxiety. A recent study by Yamazaki, Toyama, and Ubed (2018) using a sample of Indonesian managers documented that abstract conceptualization (AC) over concrete experience (CE), and active experimentation (AE) over reflective observation (RO), were associated with self-efficacy beliefs. In other words, people with a Diverging learning style have a lower level of self-efficacy than those with a Converging learning style. In the area of sport study, Nazerian et al. (2011) found a relationship between state and trait anxiety and self-confidence; thus, a future study should explore how learning style, anxiety, and self-confidence are interrelated.

As a practical implication, educational institutions and university teachers may want to pay special attention to freshmen with a Diverging learning style, who tend to have a higher level of state and trait anxiety. As the Diverging learning style was one of the most common learning styles in Japanese universities, it is important for instructors in Japanese universities to address this anxiety either by (1) developing ways to teach for Diverging

undergraduate students or (2) finding ways to develop the undeveloped learning style of the students. First, since there is a match between the Diverging learning style and the Facilitator educator role (Kolb & Kolb, 2017), if university teachers employ a warm, friendly, and interpersonal approach to Diverging-style freshmen, their anxiety level may decrease. These actions may also increase students' motivation to learn. The literature supports the role of teachers as social agents in motivating student learning (Koca, 2016), and this perspective also relates to self-determination theory (Deci & Ryan, 2002). Second, an instructor may need to provide an action-oriented session or encourage freshmen to be more active step by step. These activities may help students enhance their active experimentation (AE) learning mode. As a result, the freshmen may experience less anxiety.

6. LIMITATIONS

One limitation relates to a methodological concern. Individuals' psychological attributions during a transitional period may be influenced by societal factors such as living alone or living with family; living in a suburb, rural area, or metropolitan area; and having friends from the same high school. Thus, a promising research idea is to consider how those variables affect students' anxiety as control variables. Additionally, our study relied on a theoretical approach with a quantitative method. Qualitative methods, such as student interviews, might give rich information to aid in understanding students in a transitional learning situation and what makes them feel anxiety to learn.

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