

Chapter # 16

LEARNING STYLES OF GENERATION Z BASED ON KOLB'S LEARNING THEORY: A CASE OF INDONESIAN UNDERGRADUATES MAJORING IN EDUCATION

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ABSTRACT

This study aimed to empirically examine the preferred learning styles of undergraduate students of Generation Z based on Kolb's learning theory. The literature has highlighted unique learning characteristics of Generation Z, but empirical investigations have been inconclusive in terms of Generation Z's learning style, particularly in relation to Kolb's learning model. We applied Kolb's Learning Style Inventory, examining 423 undergraduate elementary education students in an Indonesian university. All of the participants were in Generation Z, ranging from 18 to 23 years old in 2023. Results revealed that as a whole, students preferred the learning mode of abstract conceptualization (i.e., thinking) over concrete experience (i.e., feeling), as well as preferred the mode of reflective observation (i.e., reflecting) over active experimentation (i.e., acting). Furthermore, the most common learning style was Diverging (63%); the second, Assimilating (28%); the third, Converging (5%); and finally, the fourth, Accommodating (4%). Based on these results, we discuss implications and limitations.

Keywords: learning style, Generation Z, Kolb's learning theory, Indonesian university, teacher education.

1. INTRODUCTION

Since Prensky (2001) proposed the term *digital natives* as a feature of a new generation after Millennials, the characteristics of this generation, known as Generation Z, have been widely studied. Typically, Generation Z is considered to include those born between 1995–1997 and 2010–2012. Among their characteristics, learning and educational aspects have frequently been the focus of researchers and scholars (see Isaacs, Scott, & Nisly, 2020; Nicholas, 2019; Sayekti, Habibah, & Rahmawati, 2020; Schwieger & Ladwig, 2018; Seemiller & Grace, 2017; Yu, 2020). Conceptual and review studies on Generation Z have presented a list of unique learning characteristics (see Isaacs et al., 2020; Schwieger & Ladwig, 2018; Seemiller & Grace, 2017; Shorey, Chan, Rajendran, & Ang, 2021), and a number of empirical examinations have begun to examine Generation Z's preferred approach to learning, which is called a 'learning style', in educational institutions and learning contexts. Although numerous learning styles, models, and measures have been studied in various disciplines (Coffield, Moseley, Hall, & Ecclestone, 2004), several empirical studies on Generation Z have applied Kolb's (Kolb, 1984; Kolb & Kolb, 2017) learning model to identify the learning style of Generation Z (e.g., Joonas, Mahfouz, González-Trujillo, & Ruiz, 2021; Jurenka, Stareček, Vraňáková, & Cagaňová, 2018; Manzoní, Caporarello, Cirulli, & Magni, 2021). However, the research on learning styles of

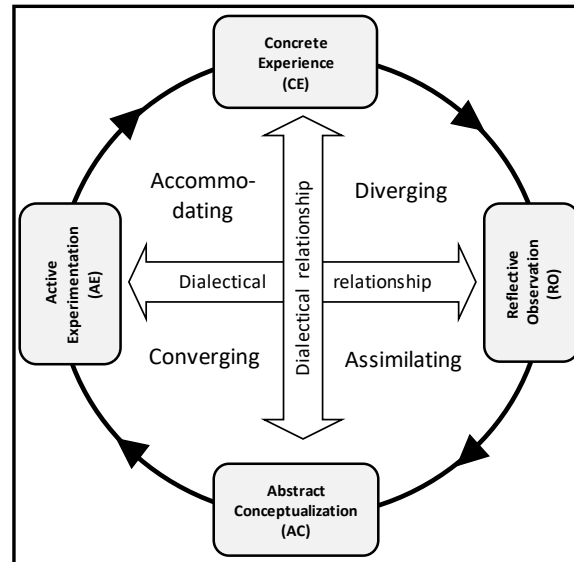
Generation Z using Kolb's learning model has provided not only inconsistent results but also methodological limitations. Thus, it seemed important to fill these gaps. Accordingly, the aim of this study was to examine what learning style Generation Z undergraduate students prefer to employ with regard to Kolb's learning model and measure.

2. LEARNING STYLE AND KOLB'S LEARNING MODEL

For almost half a century, learning style has been studied in various academic and organizational areas. Early research on learning style focused on the process of how individuals learn in learning environments as well as a measurement model of how individuals' way of learning can be examined and identified. More recently, learning style has been studied in relation to broader contextual differences, including country and culture (Yamazaki, 2005) and generations (Albadi & Zollinger, 2021; Nossoni, 2021). Learning style generally refers to an individual's preferred approach to learning (Price, 2004). Many definitions and models of learning style exist (Richardson, 2011). Coffield et al. (2004) reviewed learning style studies and discovered 71 learning style models. In this study, we focused on Kolb's learning model not only because of its intellectual approach to information processing (Cassidy, 2004), but also because it is one of the most well-known and disseminated learning models with its measure (Hawk & Shah, 2007).

By integrating influential learning theories and models in disciplines relevant to psychology, education, and behavior science, Kolb (1984) developed experiential learning theory. The unique feature of experiential learning theory is to focus on individuals' experiences as a central role of human learning (Kolb, 1984; Kolb & Kolb, 2017). According to Kolb's learning theory, people are required to apply four learning modes in learning situations: concrete experience (CE), abstract conceptualization (AC), reflective observation (RO), and active experimentation (AE). CE serves to grasp an experience by using sensing and feelings, which becomes apprehensive knowledge that can be described as implicit. This knowledge is processed by the mode of RO, which requires people to carefully watch and patiently listen to others. As a result of this processing, knowledge becomes more comprehensive, which is captured by the mode of AC. The role of AC is to make human/individual experience clearly and explicitly expressed by words, concepts, numbers, and logic. Such knowledge is a foundation for testing whether it is correct or not by the mode of AE, which requires taking action, leading to a new experience. The CE mode is dialectically opposite the AC mode, while the RO mode is dialectically contrasted with the AE mode. A combination of the four learning modes leads to four basic learning styles: the Diverging learning style (CE and RO), the Assimilating style (AC and RO), the Converging style (AC and AE), and the Accommodating style (CE and AE). Figure 1 depicts Kolb's experiential learning model.

Figure 1.
Kolb's experiential learning model and four learning styles.



3. GENERATION Z AND LEARNING STYLE

Predecessor generation in order from old to new before Generation Z refers to Baby Boomer, Generation X, and Generation Y (i.e., Millennials). As each generation has distinguished characteristics, Generation Z also possesses ones (Shatto & Erwin, 2016; Shorey et al., 2021). For example, Baby Boomers are seen as competitive, loyal, and reliable at work and home (Venter, 2017), while Generation Xers are self-reliant, pursuing skill development due to their young age without relatively parental attention (Berkup, 2014). Generation Y was described as being sheltered, confident, team-oriented, and pressured (Howe & Strauss, 2000).

Generation Z is also called Gen Z, Digital Natives, iGeneration, iGen, and Net Generation. The everyday personal and academic life of Generation Z students has been largely influenced by information and communication technologies since they were young (Ali, Jamil, Ahmad, Mohamed, & Yaacob, 2017; Schwieger & Ladwig, 2018). They have always had internet access to information by means of various channels and devices inside or outside of class, and they disseminate information and messages quickly (Yu, 2020). Additionally, they also interact with their learning environments through “collaborative projects, interactive games or online discussions” (Gargallo-Camarillas, 2021, p. 51). The immediate activities and ability to get, deal with, and send information and messages may affect their learning style (Nicholas, 2019), personality (Ali et al., 2017), and unique characteristics. For example, Schwieger and Ladwig (2018) investigated nine studies on Generation Z, listing their characteristics as entrepreneurial, hands-on experience, personalized micro-experiences, self-reliant, multitasking, pragmatic, and self-informed. Seemiller and Grace (2017) noted that Generation Z students are good at observation and intrapersonal learning as learning characteristics. Consistently, the study of Shatto and Erwin (2016) indicated that Generation Z has a tendency to be observing learners.

In contrast, the study of Mosca, Curtis, and Savoth (2019) reported that Generation Z students prefer to learn by doing rather than listening in class.

To the best of our knowledge, five empirical studies have been conducted on the learning style of Generation Z applying Kolb’s learning model: the studies of Galingan (2019), Joonas et al. (2021), Jurenka et al. (2018), Manzoni et al. (2021), and Seemiller, Grace, Campagnolo, Alves, and De Borba (2019). Table 1 summarizes study characteristics and learning style results. All studies reported the ratio/distribution of the four learning styles, though learning style names varied based on research features and aims. For example, the *Diverging* learning style, which is the original name applied in Kolb’s learning theory, was changed to Reflector (Galingan, 2019), Innovator (Jurenka et al., 2018), and Imagination (Seemiller et al., 2019). Also, Kolb’s learning theory is aligned with Kolb’s Learning Style Inventory (KLSI), with a forced-choice form to match dialectical learning dimensions; however, two studies modified the response from forced-choice to a Likert-type scale (Manzoni et al., 2021; Seemiller et al., 2019), which presents limitations in comparing studies. As the study of Manzoni et al. (2021) also documented, their study participants also included Millennials, so that the study’s learning style results may have reflected both Generation Z and Millennials. Finally, it should be noted that the percentage expression described in the study of Seemiller et al. (2019) was different from those of the other studies. Their study applied a 5-point Likert scale instead of the forced-choice form and reported “the frequency of responses for those who indicated ‘often’ or ‘always’ using each style” (Seemiller et al., 2019, p. 361).

Based on the differences in these studies, it seemed difficult to compare the learning style result of one study with that of the others. Yet, some insight can be gained by listing the first and second dominant styles of learning for each study. The study of Joonas et al. (2021) showed the first learning style was Converging and the second learning styles were Assimilating and Accommodating equally; that of Manzoni et al. (2021), Assimilating (first) and Diverging and Accommodating (second) equally; that of Galingan (2019), Reflector (=Diverging, first) and Pragmatist (=Converging, second); that of Jurenka et al. (2018), Practice (=Converging, first), and Dynamic (=Accommodating, second); and that of Seemiller et al. (2019), Logic in USA and Brazil (=Assimilating, first), and Experience in USA (=Accommodating, second) and Experience and Practicality in Brazil (=Converging, equally as the second). Accordingly, it did not appear that a common learning style dominated in Generation Z.

Table 1.
Summary of five studies’ results of learning style and Generation Z.

Authors	N	Country	Institution	Learning Style**			
				Diverging	Assimilating	Converging	Accommodating
Joonas et al. (2021)	120	Mexico	University	18 15%	29 24%	44 37%	29 24%
Manzoni et al.* (2021)	592	Italy	University	150 25%	164 28%	128 22%	150 25%
				Reflector	Theorist	Pragmatist	Activist
Galingan (2019)	149	Philippines	University	63 42%	11 7%	40 27%	35 23%
				Innovator	Analysist	Practice	Dynamic
Jurenka et al. (2018)	40	Slovakia	Secondary	2 5%	7 18%	22 55%	8 20%
				Imagination	Logic	Practicality	Experience
Seemiller et al.*** (2019)	701	USA	College	390 56%	587 84%	524 75%	563 80%
	1481	Brazil	College	840 57%	1118 76%	884 60%	886 60%

Note. *Sample size and frequency numbers were estimated by the authors based on precepts presented in the study of Manzoni et al. (2021). **Names of the learning styles reflect what was used in each study, but the heading at the top indicates the original term used by Kolb. ***Frequency numbers and percentages were resulted from the first and second highest selection based on the usage of Likert scale.

4. METHODS

As a research site, our study sample was undergraduate students of the Faculty of Education in an Indonesian university. As we discussed earlier, this study used Kolb's learning model for analysis. In terms of study on Generation Z's learning style in Indonesian university, there were very few studies on them except the study of Sayekti et al. (2020); however, they applied VAK learning model (Fleming & Bonwell, 2019)

This study involved 423 undergraduate students majoring in elementary education at an Indonesian university. As part of our research project, online survey questionnaires were distributed and collected in the spring term of 2023 at the Faculty of Teacher Training and Education. Participants' ages ranged from 18 to 23 years old; thus, all were considered Generation Z students. Seventy-five percent of the participants were 19, 20, or 21 years old. There were 61 male students (14%) and 362 female students (86%). This study was approved by the university, and the consent of study participants was obtained.

To identify students' learning style, we used version 3 of Kolb's (1999) KLSI translated into the Indonesian language. The psychometrics of the KLSI were investigated by several researchers (Andreou, Papastavrou, Lemonidou, Mattheou, & Merkouris, 2015), showing that it had better psychometric properties than the previous version. The KLSI has been applied in a great number of countries (Kolb & Kolb, 2017).

To examine an individual's preferred learning approach in a learning situation, the KLSI has 12 questions. For each question, there are four options theoretically relevant to the four modes of learning: concrete experience (CE), abstract conceptualization (AC), reflective observation (RO), and active experimentation (AE). The KLSI asks the individual to choose the best option (most preferred), the second best, the third best, and the least preferred. Thus, the KLSI applies a forced-choice approach in alignment with the dialectical learning aspects theorized in Kolb's experiential learning theory. To determine an individual's learning style, the total score for concrete experience (CE) is subtracted from that of abstract conceptualization (AC), which is in the same dialectical learning dimension. Results of the calculated values indicate a relative learning preference for AC vs. CE. Similarly, subtracting the total score for reflective observation (RO) from that of active experimentation (AE) leads to a description of a relative learning preference for AE vs. RO. The normative scores of the third version of the LSI are 4.3 as the value of AC – CE, and 5.9 as the value of AE – RO (Kolb, 1999) to determine an individual's learning style. Additionally, the KLSI is designed to examine an individual's balanced learning tendency in terms of the same dialectical learning dimension (i.e., AC vs. CE and AE vs. RO; Mainemelis, Boyatzis, & Kolb, 2002). Such a balanced learning tendency is determined by adjusted absolute scores of each dialectical learning demission: $|AC - CE|$ and $|AE - RO|$. The former value is the absolute value of $(AC - (4 + CE))$, while the latter value is that of $(AE - (6 + RO))$ (Mainemelis et al., 2002). An absolute value that is closer to 0 means more balance in a learning dimension, while a value further away from 0 shows less balance in that dimension (Mainemelis et al., 2002). Another interpretation is that the more the scores are balanced, the more flexibility an individual has within the learning dimension (Mainemelis et al., 2002).

5. RESULTS

As depicted in Table 2, results of correlation analysis illustrated statistical relationships among eight key learning style variables and three demographic variables: age, gender, and academic year. To analyze relationships between the learning variables and gender, this study used a gender code: male = 1 and female =2. Student ages were significantly correlated with the mode of abstract conceptualization (AC; $r = 0.12, p < 0.05$), had a marginally negative relationship with the mode of reflective observation (RO; $r = -0.09, p < 0.10$), and had a marginally positive relationship with a relative preference for AC over CE (i.e., AC – CE; $r = 0.08, p < 0.10$). In terms of student gender, there was a marginal positive relationship between gender and AC ($r = 0.08, p < 0.10$) as well as AC – CE ($r = 0.09, p < 0.10$). Those results concerning demographics in relation to learning style variables might be important when considering the influence of age and gender on learning styles of Generation Z students.

Table 2.
Results of correlation analysis of key learning style variables and demographic variables.

	Mean	SD	Age	Gender	Academic year	CE	AC	RO	AE	AC-CE	AE-RO	AC-CE	AE-RO
Age	20.29	1.24	-										
Gender	-	-	0.05	-									
Academic year	2.83	1.88	0.46 **	0.02	-								
CE	30.59	3.77	-0.01	-0.07	0.00	-							
AC	30.79	4.08	0.12 *	0.08 †	0.06	-0.37 **	-						
RO	30.98	4.29	-0.09 †	-0.06	-0.05	-0.27 **	-0.46 **	-					
AE	27.65	3.61	-0.01	0.05	0.00	-0.3 **	-0.2 **	-0.39 **	-				
AC-CE	0.20	6.50	0.08 †	0.09 †	0.04	-0.81 **	0.84 **	-0.13 *	0.04	-			
AE-RO	-3.33	6.59	0.05	0.07	0.03	0.02	0.18 **	-0.86 **	0.08 **	0.11 †	-		
AC-CE	5.88	4.70	-0.03	-0.07	-0.08	0.57 **	-0.6 **	0.08	-0.01	-0.71 **	-0.06	-	
AE-RO	9.84	5.80	-0.03	-0.05	-0.01	-0.05	-0.15 **	0.81 **	-0.74 **	-0.07	-0.93 **	0.03	

Note. ** $p < 0.01$, * $p < 0.05$, † $p < 0.10$; CE = concrete experience; AC = abstract conceptualization; RO = reflective observation; AE = active experimentation; AC – CE = relative preference for AC vs. CE; AE – RO = relative preference of AE vs. RO; |AC – CE| = balanced score between AC and CE, absolute value of [AC – (4 + CE)]; |AE – RO| = balanced score between AE and RO, absolute value of [AE – (6 + RO)].

Mean scores of four learning modes (CE, AC, RO, and AE) in Table 2 show the degree of learning mode preference: Indonesian undergraduates as a whole preferred to use the three modes of AC, CE, and RO to a similar degree, while they had a lower preference for applying the mode of AE. Figure 2 visually illustrates Generation Z students' preferences for the four learning modes in a learning situation.

Mean scores of AC – CE and AE – RO indicated a relative preference for one learning mode over the other in the same dialectical learning dimension (AC vs. CE, and AE vs. RO). Since the normative scores are AC – CE = 4.3 and AE – RO = 5.9, Generation Z Indonesian undergraduate students as a group exhibited much lower scores in the dialectical learning dimension (mean of AC – CE = 0.20 and mean of AE – RO = -3.33). Thus, Indonesian students as a group prefer to use CE more than AC in comparison with the norm, while they prefer to apply RO more than AE. These scores showed that their learning style as a group was the Diverging learning style.

Mean scores of $|AC - CE|$ and $|AE - RO|$ described a balanced tendency of the Indonesian students within the same dialectical learning dimension. As shown in Table 2, the score of $|AC - CE|$ was 5.88, while that of $|AE - RO|$ was 9.84, indicating that the Indonesian students as a group were more balanced in the learning dimension of AC - CE than that of AE - RO. This explanation is also consistent with Figure 2, which showed that the degree of the CE mode was similar to that of the AC mode, whereas the degree of the RO mode was much greater than that of the AE mode. Accordingly, it seems that Indonesian students tend to be more flexible to adapt to both AC and CE learning situations; however, they may not be so flexible with the learning dimension of AE and RO.

Based on a cut-off point using the normative scores ($AC - CE = 4.3$ and $AE - RO = 5.9$), four learning styles can be specified: Diverging, Assimilating, Converging, and Accommodating (Kolb, 1999). Table 3 presents the frequency distribution of the four learning styles per age and gender. The highest number of students had a learning style of Diverging, 266 (63%); followed by Assimilating, 118 (28%); Converging, 22 (5%); and finally Accommodating, 17 (4%). These learning style results show a learning mode of reflective observation (RO), which consists of both Diverging and Assimilating learning styles.

Figure 2.
Degrees of four learning modes among Indonesian undergraduates.

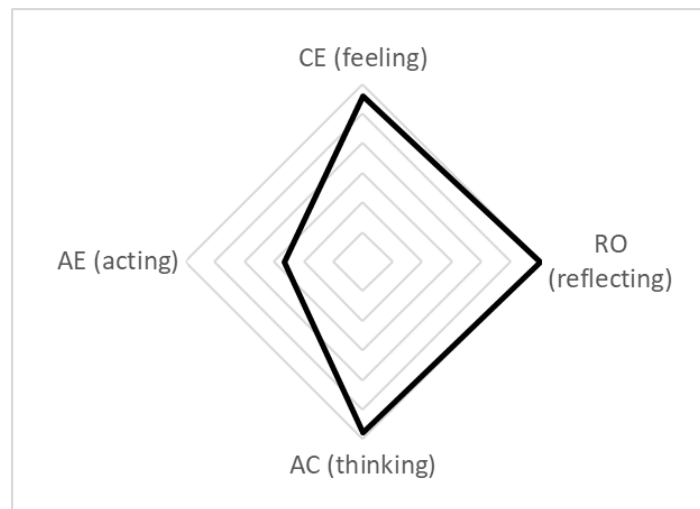


Table 3.
Frequency distribution of four learning styles per age and gender.

		Learning Style				
		Diverging	Assimilating	Converging	Accommodating	Total
Age	18	15	9	1	0	25
	19	65	26	3	8	102
	20	78	32	1	3	114
	21	61	30	6	4	101
	22	40	18	9	2	69
	23	7	3	2	0	12
Gender	male	44	14	1	2	61
	female	222	104	21	15	362
Total		266	118	22	17	423
percent		63%	28%	5%	4%	100%

6. DISCUSSION

This study explored in what way Generation Z students prefer to learn by applying Kolb’s learning theory in an Indonesian university. Our study results revealed that their learning style as a group represented a Diverging learning style that accentuates the two learning modes of concrete experience (CE) and reflective observation (RO). Congruently, the largest frequency distribution among four learning styles was also the Diverging style followed by the Assimilating style. The common learning mode of these two learning styles is reflective observation (RO), which suggests the weak usage of the mode of active experimentation (AE) in a learning situation. This finding can be seen in Figure 2, which reflects a lower degree of the AE mode. Finally, our Indonesian Generation Z participants majoring in elementary education exhibited a more balanced learning tendency in a learning situation requiring the AC and CE modes than in that demanding the AE and RO modes. This balanced tendency suggests that they become more flexible when learning in a context that requires either AC or CE modes. For example, when people participate in a field work project, they may have to capture hands-on experiences from an immediate situation, whereas they may be required to express thoughts in the form of speaking or writing. Although the situation is complex, those who possess a balanced style of learning with AC and CE modes would be able to respond to it properly.

When comparing our results with the past five Generation Z studies using Kolb’s learning model discussed in the earlier section, we found few similarities. The study of Galingan (2019) using the sample of engineering university students reported that the learning style of Reflector (Diverging) was most dominant, but that of Pragmatist (Converging) and that of Activist (Accommodating) were the second and third largest group, which was different from our results. In conjunction with past studies, our results imply that an influence of factors relevant to generations on learning style might not be enough to determine a certain learning style as unique to Generation Z. To further develop the literature of Generation Z’s learning style, it may be important to consider other influential factors such as educational disciplines of participants or their majors, which

affect the formation of learning style (Kolb, 1984), as well as cultural differences (Yamazaki, 2005). This perspective may allow us to develop a research design for study of learning styles and Generation Z, including such factors as educational majors and/or country cultures.

Past studies focused on the frequency distribution of learning style of Generation Z without providing other learning style statistics. This fact may enable us to offer a methodological implication. Our study reported not only the frequency distribution of learning style as a presentation of dominant learning style, but also other learning style results relevant to eight learning style variables. With this approach, research results allow us to capture more comprehensive and broader perspectives to understand the learning styles of Generation Z students. We acknowledge that all studies have their own aims, including other critical variables, or they do not examine only the learning style of Generation Z students; however, we still believe that the eight key learning style variables used in our study contain rich information, which will provide a fuller picture of Generation Z's learning style.

The final implication based of this study concerns educational practice in class. The learning style of Generation Z students as a whole in the Indonesian university was Diverging, with 63% of participants having a Diverging learning style and 28% having an Assimilating style. Since the majority of students tend to prefer to rely on the mode of reflective observation (RO), they feel comfortable with lecture as a teaching method, requiring them to observe, watch, and listen carefully in class. It should be added that these human behaviors and activities are characteristics of Generation Z (Seemiller & Grace, 2017). Because of students' strong RO mode, instructors need to give students enough time to respond to questions or assignments. Theoretically, those with the RO mode of learning would feel better taking time for actions (i.e., answering questions) by gathering various information and points of views (Kolb, 1984, 1999; Kolb & Kolb, 2017). Also, instructors should focus on two teaching approaches: a friendly attitude towards those with a Diverging learning style, and intellectual interaction towards those with an Assimilating learning style. Educational roles in relation to student learning styles need to be considered and practiced for the enhancement of students' learning and development in class (Kolb & Kolb, 2017).

There were several limitations of this study. First, although we exclusively applied the learning style founded on Kolb's experiential learning theory in this study, there are multiple learning styles and measures in the literature, which we did not focus on. Second, in order to identify the learning style of Generation Z students, this study used a sample of Indonesian undergraduates majoring in elementary education. To support, and even generalize, our results, it will be critical to investigate participants who have different demographic characteristics like other majors/programs, other universities, and different countries. Third, our analysis and results relied on one group of the sample belonging to Generation Z using the KLSI measure that enables us to identify individuals' learning styles and learning characteristics. To better specify the uniqueness of Generation Z, comparative studies between Generation Z and other generations like Generation X and Millennials may be a useful research design.

7. CONCLUSION

Our study presented and discussed more comprehensive results of the learning style of Generation Z students based on Kolb's learning model. Nevertheless, much is still not clear in terms of the learning style of Generation Z students. To further advance the

literature on the learning style of Generation Z, it will be essential to accumulate more empirical investigations across majors, institutions, and country cultures.

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