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A SCOPING REVIEW APPROACH TO GENERATION Z'S LEARNING STYLE IN HIGHER EDUCATION

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Abstract

Increasingly, students in institutions of higher education are from Generation Z rather than the Millennial generation. This young generation represents individuals born between 1995-1997 and 2010-2012. Like each predecessor generation—Silent, Baby Boomer, Generation X, and Millennials in order from old to new—Generation Z also has unique characteristics. The literature has started to clarify the unique characteristics of this generation. Yet, empirical research on the learning style of Generation Z recently began in the context of higher education; thus, it remains unclear what learning style Generation Z students have as a whole. Accordingly, the aim of this study was to understand characteristics of Generation Z's learning styles by mapping emerging empirical results of learning styles for Generation Z. This study was a systematic scoping review applying the PRISMA flowchart. Following the identification of 945 potential studies, we identified 21 empirical studies of Generation Z in relation to the four groups of existing learning style theories with scales. We found that a single dominant learning style of Generation Z students could not be specified because each empirical study reported a particular learning style according to the learning style theory applied. Thus, the predominant learning styles of Generation Z depended on the learning theory and scales: that is, Concrete Sequential learning style of the Gregorc theory as a unimodal type; a Diverging learning style of the Kolb's model; an Active, Sensing, Visual, and Sequential learning style as dominant of the Felder-Silverman's/Felder-Soloman's paradigm; and a Visual style of the VAK and a Kinesthetic one of the VARK.

Keywords: *Learning style, Generation Z, scoping review, higher education.*

1. Introduction

Studies on Generation Z have recently come out that illustrate its characteristics. For example, Seemiller and Grace (2017) described three distinct characteristics of Generation Z with regard to learning preferences, community engagement, and career aspirations based on their empirical findings. Isaacs, Scott, and Nisly (2020) discussed Generation Z's characteristics and integrated them into seven key themes—learning style, teaching preference, communication, feedback, technology, social media, and risk/financial views—which can differentiate between Generation Z and Millennials even though both generations have grown up in a similar era of advanced technology. To more profoundly understand unique learning aspects of Generation Z students, learning style has been specifically considered (Seemiller & Grace, 2017). Since learning style is an indicator of an individual's preferred way of learning in learning situations (Kolb & Kolb, 2017), it is critical to know how Generation Z students typically learn in higher education institutions, which reflect today's technological and digitalized information environments. Yet, empirical research on the learning style of Generation Z only recently began in the context of higher education, and it remains uncertain to what extent recent work clarifies the learning style of Generation Z. Accordingly, the aim of the current study was to understand the learning style of Generation Z as a whole with inclusion of only empirical evidence-based research related to any educational program, major, or discipline by applying a scoping review approach. Consistent with our study aim, we had one research question: What are the learning styles of Generation Z?

2. Learning style and Generation Z

Multiple definitions of learning style exist in the literature and may overwhelm educators and researchers. Coffield et al. (2004) identified 71 learning style models and categorized five groups based on 13 significant models. Using their classification, we focused on the descriptions of style models

categorized into either the genetic component family, including human functioning modalities, or flexibility in stable learning preferences (see Coffield et al., 2004). Here, five learning style models are particularly relevant to those categories: Kolb's (1984) learning model (Kolb & Kolb, 2017), Gregorc's learning model (1982), Fleming's VARK model (Fleming & Bonwell, 2019), Felder-Silverman's (1988) learning model, and Dunn and Dunn's learning styles model (Honigsfeld & Dunn, 2003).

Several studies have highlighted certain learning characteristics of Generation Z (see Shorey et al., 2021). For example, Seemiller and Grace (2017) pointed out two aspects of Generation Z's learning characteristics: observation and intrapersonal learning. Regarding observation, Generation Z students prefer watching others do an assigned task before doing it themselves (Seemiller & Grace, 2017). As an example, Generation Z seeks information from videos or YouTube when encountering something difficult or hard to understand (Seemiller & Grace, 2017). The other aspect is Generation Z's preference for intrapersonal learning (Seemiller and Grace, 2017).

3. Methods

To execute a scoring review approach, we relied principally on the guideline for review proposed by Arksey and O'Malley (2005) and the PRISMA flowchart (Moher et al., 2009). Searches were carried out applying the key term with searching formula: ("Generation Z" OR "Gen Z" OR "iGen" OR "Digital Natives" OR "Net Generation") AND ("learning style" OR "preferred learning way"). The literature search was conducted on June 1, 2024. The search was limited within English-language publication categories of articles, conference papers, and book chapters, and it was conducted with no time boundary. The database search resulted in a total of 938 potentially eligible studies: 819 from ProQuest Central, and 119 from Scopus. In order to further find potentially eligible researches, we also conducted an additional search by using the reference section of the studies selected and our learning style researches, as suggested by Siddaway, Wood, and Hedges (2019). With this effort, we added 5 articles and 2 conference paper, resulting in a total of 945. Then, we eliminated 199 studies published in 2012 or before because students born in 1995 typically started to enter into a higher educational institution in 2013, resulting in a total of 746. Next, we checked for duplicates and identified 32 duplicates to be eliminated from 746 studies. Consequently, 714 studies were left to be further investigated through title and abstract screening.

For the inclusion criteria, studies needed to be empirical studies in English that used a scale to measure learning styles of the participants of Generation Z and showed quantitative results related to the participants' learning style that measured by the five learning style scales discussed earlier. The publication types included were journal articles, conference proceedings, and book chapters. Two authors separately screened and analyzed the titles and abstracts of the 714 studies by applying the inclusion and exclusion criteria. Then, the authors compared their results for the screened studies and discussed discrepancies until reaching consensus. As a result, a total of 628 studies were removed, whereas 86 eligible studies remained to conduct a subsequent process of eligibility. Then, those studies were further analyzed independently by the same authors to determine which studies were included or excluded as final study selections. In the occasion of disagreement, the third author was consulted. Among the 86 studies, 65 were removed due to the reasons of exclusion. Accordingly, 21 studies were eventually included in the final study selection based on criteria. Table 1 lists the 21 included studies. Detailed citation information of the 21 studies is listed in Appendix A separately from the section of references.

4. Results

As illustrated in Tables 1 and 2, different types of learning style models and scales were applied among the 21 identified studies. First, only one study used the Gregorc Style Delineator. For that study, results showed that the dominant learning style of Generation Z is Concrete Sequential learning style (43%) as a unimodal style. The second analysis was conducted for seven studies applying Kolb's Learning Style Inventory. For 32%, the most dominant learning style was the Diverging learning style. Five studies employed the Felder-Silverman's or Felder-Soloman's Index of Learning Style. Among them, the study of Reesman and Birdsong (2023) was excluded because it did not present learning style frequency of Generation Z. Most study results for the dominant learning style of Generation Z were consistent: the dominant learning style was composed of an Active, Sensing, Visual, and Sequential learning style. The final analysis concerned the VAK/VARK learning model. The Visual learning style with 55% as a single dominant learning style modality was showed in the VAK model. The analysis using the VARK model was conducted in two different ways. The first analysis focused on unimodal learning styles, while the second one emphasized each four styles relevant to not only unimodal styles but also multimodal ones including unimodal learning modes. Regardless of two ways of analyses, a dominant learning style was the Kinesthetic one with 34% of a unimodal type as well as with 28% of the other one.

Table 1. Characteristics and Results for Each of the 21 Studies Included in the Review.

Authors & year	Study characteristics				Results
	N	**Educational Institution**	**Faculty/major/ program**	**Scale/learning style model**	**Major learning style of Generation Z**
Albadi and Zollinger, 2021	466	University, USA	Interior design	Gregorc Style Delineator	Bimodal learning style; Concrete Sequential learning style as a unimodal one
Baherimoghadam et al., 2021	85(1)	University, Iran	Dentistry	Felder-Soloman's Index of Learning Styles	Reflective, Sensing, Visual, & Sequential modes
Eid et al., 2021	113	University, Saudi Arabia	Medicine	VARK learning model	Multimodal learning style; Additionally, Aural learning style as a unimodal style
Fahim et al., 2021	1473	University, Pakistan	Medicine & dentistry	VARK learning model	Multimodal learning style; Additionally, Kinesthetic learning style as a unimodal style
Galingan, 2019	149 (360)(2)	University, Philippines	Engineering	Kolb's Learning Style Inventory and Felder-Silverman's Index of Learning Style	Reflector(3)(Diverging) learning style; Active, Sensing, Visual, & Sequential modes
Hanawi et al., 2022	84	University, Malaysia	Biomedical science	Learning Style Questionnaire (VAK learning model)	Visual learning style
Ishak et al., 2022	300	Undergraduate, Malaysia	Medicine, pharmacy, & allied health	VARK learning model	Multimodal learning style; Additionally, Kinesthetic learning style as a unimodal style
Joonas et al., 2021	120(1)	Undergraduate, Mexico	Not described	Kolb's Learning Style Inventory	Converging learning style
Manzoni et al., 2021	592 (870)(2)	University, Italy	MSc and executive education	Kolb's Learning Style Inventory	Assimilating learning style
Maulina et al., 2020	165	College, Indonesia	Physics teaching	VAK learning model	Visual learning style
Nossoni, 2021	33	University, USA	Engineering	Felder-Silverman's Index of Learning Style	Active, Sensing, Visual, & Sequential modes
Nwajiuba & Onyeneke, 2023	133	University, Nigeria	Science, social science, & humanity	VARK learning model	Auditory learning style
Othman et al., 2019	305	University, Malaysia	Poly-tech	VAK learning model	Visual learning style
Payaprom & Payaprom, 2020	372	University, Thailand	Language	VARK learning model	Multimodal learning style; Additionally, Kinesthetic learning style as a unimodal style
Reesman & Birdsong, 2023	112 (706)(2)	University, USA	Pilot flight	Felder-Soloman's Index of Learning Styles	Active, Sensing, Visual, & Sequential modes
Seemiller et al., 2019	701	College, USA	Not described	Kolb's Learning Style Inventory	Logic(3) (Assimilating) learning style
	1481	College, Brazil	Not described	Kolb's Learning Style Inventory	Logic (Assimilating) learning style
Silvestre et al., 2022	95	University, USA	Dentistry	VARK learning model	Visual learning style
Sousa, Mendonça, J., & Fontão, 2023	519	University, Portugal	Engineering	Kolb's Learning Style Inventory	Accommodating learning style
Toyama & Yamazaki, 2021	423	University, Japan	Business administration	Kolb's Learning Style Inventory	Diverging learning style
Turner & Gurenlian, 2023	89 (150)(2)	University, USA	Dental hygiene	Felder-Soloman's Index of Learning Styles	Active, Sensing, Visual, & Sequential modes
Yamazaki, Toyama, & Wijayanti, 2024	423	University, Indonesia	Elementary education	Kolb's Learning Style Inventory	Diverging learning style

Note. (1) Sample might include those who were born before 1995. (2) The number in parentheses indicates the total study sample, including those not in Generation Z. (3) This study used the original names for the learning styles based on Kolb's learning theory: the learning style of Theorist and Logic is Assimilating learning style; that of Activist and Experience is Accommodating learning style; that of Pragmatist and Practicality is Converging learning style; and that of Reflector and Imagination is Diverging learning style.

Table 2. Learning Style Frequency Tendencies Shown in the 21 Studies Included in the Review[1].

Learning style model or scale	**Dominant learning style and mode**							
Gregorc Style Delineator	Concrete Sequential		Concrete Random		Abstract Random		Abstract Sequential	
Albadi & Zollinger (2021)[2]	43%		26%		24%		6%	
Kolb's Learning Style Inventory[3]	Diverging		Assimilating		Converging		Accommodating	
Galingan (2019)	42%		7%		27%		23%	
Joonas et al. (2021)	15%		24%		37%		24%	
Manzoni et al. (2021)	25%		28%		22%		25%	
Seemiller et al. (2019):Brazil	19%		28%		25%		27%	
Seemiller et al. (2019):USA	23%		30%		24%		24%	
Sousa et al. (2023)	20%		22%		27%		30%	
Toyama & Yamazaki (2020)	46%		17%		4%		33%	
Yamazaki et al. (2024)	63%		28%		5%		4%	
Average % of each learning style	32%		23%		21%		24%	
Felder-Silverman's/Felder-Soloman's Index of Learning Style	Active	Reflective	Sensing	Intuitive	Visual	Verbal	Sequential	Global
Baherimoghadom et al. (2021)	47%	53%	72%	28%	85%	15%	64%	36%
Galingan (2019)	56%	44%	70%	30%	79%	21%	73%	27%
Nossoni (2021)	64%	36%	67%	33%	82%	18%	67%	33%
Turner & Gurenlian (2022)	71%	29%	82%	18%	78%	22%	74%	26%
Average % of each learning style	59%	41%	73%	27%	81%	19%	69%	31%
VAK learning model	Visual		Auditory		Kinesthetic			
Hanawi et al. (2022)	62%		29%		10%			
	64%		1%		35%			
Maulina et al. (2020)	55%		27%		18%			
Othman et al. (2019)[4]	38%		31%		31%			
Average % of each learning style	55%		22%		23%			
VAKR learning model	Visual		Auditory		Kinesthetic		Read/write	
	Only Unimodal	Unimodal/Multimodal	Only Unimodal	Unimodal/Multimodal	Only Unimodal	Unimodal/Multimodal	Only Unimodal	Unimodal/Multimodal
Eid et al. (2021)	24%	23%	41%	31%	26%	26%	9%	20%
Fahim et al. (2021)	31%	26%	23%	24%	34%	27%	13%	23%
Ishak et al. (2022)	14%	24%	15%	24%	42%	28%	29%	24%
Nwajiuba and Onyeneke (2023)[5]		25%		27%		25%		22%
Payaprom and Payaprom (2020)		12%		25%		42%		22%
Silvestre et al. (2022)		39%		19%		24%		18%
Average % of each learning style	23%	25%	26%	25%	34%	28%	17%	22%

Note: (1) The study of Reesman and Birdsong (2023) was excused because of no learning style frequency. Several percentages of each learning style were calculated for this study. The percentage of each study represented a ratio of each learning style frequency divided by total sample or total frequency in each study. (2) The study of Albadi and Zollinger (2021) represented only unimodal styles. (3) This study used an original name of learning style based on Kolb's learning theory. (4) The study of Othman et al. (2019) in this study showed results of combined unimodal and multimodal learning styles. (5) The name of learning style was changed to Tactile from Kinesthetic, and to Social Interpersonal from Read/write (Nwajiuba & Onyeneke, 2023).

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Appendix A. Citation information of the 21 studies included in this present study.

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