

Learning Preferences of Generation Z Undergraduates at the University of Cyberjaya

Natasha Mohd Ishak¹, Harikrishnan Ranganathan^{1*} and Kamalambal Harikrishnan²

¹Physiotherapy Programme, Faculty of Allied Health Sciences, University of Cyberjaya, Selangor, Malaysia

²St.Francis International School, Chennai, India

*Corresponding Author - email: hari4physio@gmail.com

Abstract: A new generation (Generation Z) of learners has entered universities/colleges. They were raised in an environment full of technology and high access to the online world which well affected their preferences for receiving information. It is indispensable to know their preferred learning style, which could aid in enhanced content delivery. The main aim of this study was to infer the Gen Z undergraduates' learning preferences. In this cross-sectional study, convenience sampling was applied. The VARK questionnaire link was forwarded through the student WhatsApp groups. Descriptive and group comparisons were inferred using the chi-square test with $p < 0.05$ as level of significance. Three hundred Gen Z undergraduates from University of Cyberjaya participated in this study. There is a statistically significant higher preference for multimodal learning (75.7%) with higher preference among male Gen Z undergraduates. There is a statistically significant difference in the preference for various learning styles among the undergraduates who preferred unimodal learning style. Gen Z undergraduates at the University of Cyberjaya preferred the multimodal form of learning while the kinaesthetic mode of learning was highly preferred by both unimodal and multimodal learners.

Keywords: Generation Z, Gen Z, learning preferences, learning style, undergraduates, VARK.

Introduction

A learning style implies an individual's desired way to absorb, process, understand and preserve information. In simple terms, it is the way that various students learn (Tophat.com, 2020). It performs a vital role in learners' lives (Akram Awla, 2014). A better knowledge and comprehension about the various styles will be increasingly important as classroom volume increases (Romanelli, 2009). Moreover, educators can attempt to modify their teaching style to fit their students' learning styles (Akram Awla, 2014). It has been reported that identifying learning styles at the primary education level may aid learners' achievement and reduce negative student attitudes about certain lessons (Özerem & Akkoyunlu, 2015). We believe information about the undergraduates' learning styles may also yield similar benefits. It is indispensable for undergraduates to be self-aware about their learning preferences in order to modify their study techniques accordingly (Wehrwein et al., 2007). Moreover, recognising their learning styles is inevitably vital from a pedagogical point of view (Afshan, 2019).

Multimodal learning refers to learning through a combination of various modes such as visual, aural, read/write and kinaesthetic. In previous studies, (Baykan & Nacar, 2007; Ojeh et al., 2017; Sarabi-Asiabar et al., 2015; Urval et al., 2014) the majority of the students preferred the multimodal style of



learning when compared to the unimodal style, however, there is a different preference in mode of learning among unimodal learners. Research among bachelor's medical and health science students in three universities in Malaysia has shown a preference (78.04%) for the unimodal style of learning and the most common learner type is read/write (Wong et al, 2017). Though less preference (10%) for multimodal learning is noted in another study conducted among polytechnic students in a private university in Malaysia, there is a higher preference (34.2%) for visual learning (Othman et al., 2019). The above findings depict a diversity in student preferences of learning styles.

Application of learning style inventories to improve students' self-awareness is not explored much (Childs-Kean, et al., 2020). A study among academicians in the UK depicted that though there is a general belief in application of learning styles, only one-third of them were applying it (Newton & Miah, 2017). Prior to implementing learning style-based teaching, it is worthwhile to understand the preferred learning style(s) of them (Payaprom & Payaprom, 2020). Especially it is required to explore this among the new generation of learners (Generation Z) who entered tertiary education in the last decade (Ding, Guan, & Yu, 2017).

Generation Z (Gen Z) are people born after millennials between the mid-1990s and the early 2000s (Howe, 2014). Gen Z grew up in a high-tech, on-demand, hyper-connected and impatient environment. Gen Z is the first global generation with high interest in and avenues for learning (Hampton & Keys, 2016). Technology has a powerful influence on the learning of Gen Z (Nicholas, 2019). Teaching Gen Z is challenging, since educators have to shift from conventional teaching-learning approaches and are required to find various strategies to teach in order to reach their imagination, interest and understanding (Cilliers, 2017). It has been expected that these digital natives would have a unique preference and learning style. Hence, inferring the learning style of Gen Z students is inevitable.

We tracked a study about the learning preferences of Gen Z students in Malaysia, however, they did not differentiate the preference of learning styles among students of various programmes (Othman et al., 2019). The findings of this study will add to the literature related to learning style preferences among Gen Z undergraduates. The impact of various factors such as gender and programme of study on learning style preferences were also inferred in this study.

Methods

This study is a cross-sectional study and used the convenience sampling method. The sample size for this study was calculated using Rao soft sample size calculator. The calculation was based on 5% margin of error, 95% confidence level and 50% response distribution. This study obtained approval from University of Cyberjaya research ethics Committee. The inclusion criteria of the study were undergraduate students born after 1994 irrespective of year of study. This study was conducted between March 2020 and September 2020. All the undergraduates were given an information sheet, consent form and questionnaire in a Google form that was distributed through WhatsApp. In this study a reliable (Leite et al., 2010) and valid (Fitkov-Norris & Yeghiazarian, 2015) VARK questionnaire was utilised to find out the learning preferences of each participant. Other demographic information such as the gender and programmes of the undergraduates were taken into context. This survey ceased once we achieved the response of the calculated number of sample size (N = 300).

Data Analysis

The data from Google forms were downloaded in a Microsoft Excel worksheet and analysed using SPSS (Version 22, IBM Corp., Armonk, New York). Descriptive statistics such as frequency and percentage were calculated. The chi-square test was used to infer mode of learning preferences based on the VARK mode of learning, and differences in learning preference based on gender and programme among Gen Z undergraduates in the University of Cyberjaya.

Results

Undergraduates' demographic details were tabulated in Table 1. More female undergraduates (63%) participated in this study. Both Malaysian and non-Malaysian undergraduates were involved in this study. Undergraduates from seven programmes of four faculties (medicine, pharmacy, allied health, and traditional/complementary medicine) were involved in this study. There is no equal representation of students from various programme of study as provided in Table 1.

Table 1: Demographic Details

Variable	n (%)
Gender	
Male	110 (36.7)
Female	190 (63.3)
Programme*	
BPHYSIO	38 (12.7)
BBET	19 (6.3)
MBBS	90 (30)
BPHARM	37 (12.3)
BOSH	54 (18)
BHMS	9 (3)
BPSY	53 (17.7)

**BPHYSIO*-Bachelor in Physiotherapy

BPHARM – Bachelor of Pharmacy

BPSY- Bachelor of Psychology

BHMS – Bachelor of Homeopathic Medical Science

BBET- Bachelor of Biomedical Engineering Technology

MBBS- Bachelor of Medicine and Bachelor of Surgery

BOSH – Bachelor in Occupational Safety and Health

Learning style preferences of undergraduates were tabulated in Table 2. Most of the undergraduates (75.7%) were multimodal learners while only a quarter of them preferred unimodal learning. Based on a chi-square test there was a statistically significant $\chi^2 (1, N = 300) = 79.053, p < 0.05$ preference for multimodal learning in comparison to unimodal learning. Among the overall learning preferences (including unimodal learners and multimodal learners) there was a slightly higher preference of kinaesthetic mode of learning followed by read/write and auditory mode of learning. A similar pattern of preference was noticed among the unimodal learners where a statistically (chi-square) significant difference $\chi^2 (3, N = 73) = 15.932, p < 0.05$ was deduced.

Table 2: Learning Preferences

Variable	n (%)	Level of Significance
Learning Preferences		
Unimodal	73 (24.3)	0.000*
Multimodal	227 (75.7)	
Learning Preferences (VARK) (Unimodal +Multimodal learners)		
Visual	208 (69.3)	0.001*
Auditory	208 (69.3)	
Read/write	212 (70.7)	
Kinaesthetic	239 (79.7)	
VARK Preferences of Unimodal Learners		
Visual	10 (13.7)	0.001*
Auditory	11 (15.1)	
Read/write	21 (28.8)	
Kinaesthetic	31 (42.5)	

* $p < 0.05$

Preferences in learning style based on gender and programme of study is tabulated in Table 3. There is a significant difference $\chi^2 (1, N = 300) = 9.037, p < 0.05$ in the learning preferences between male and female undergraduates. There is a higher preference for multimodal learning (85%) among male undergraduates. However, there is no significant $\chi^2 (6, N = 300) = 2.607, p > 0.05$ difference in unimodal versus multimodal learning based on the programme of the study. The majority of the Gen Z undergraduates (> 66%) irrespective of programme of study preferred multimodal style of learning.

Table 3: Difference of Learning Preferences Based on Gender and Programme

Variable	Unimodal n (%)	Multimodal n (%)	Asymptotic Sig.
Gender			
Male	16 (14.5)	94 (85.5)	0.003*
Female	57 (30.0)	133 (70.0)	
Programme			
BPHYSIO	7 (18.4)	31 (81.6)	0.856*
BBET	3 (15.8)	16 (84.2)	
MBBS	25 (27.8)	65 (72.2)	
BPHARM	9 (24.3)	28 (75.7)	
BOSH	14 (25.9)	40 (74.1)	
BHMS	3 (33.3)	6 (66.7)	
BPSY	12 (22.6)	41 (77.4)	

* $p < 0.05$

Table 4: Overall Learning Preferences among Different Genders and Programmes

Variable	Visual	Auditory	Read/write	Kinaesthetic
	n (%)	n (%)	n (%)	n (%)
Gender				
Male	83 (75.5)	85 (77.3)	84 (76.4)	90 (81.8)
Female	125 (65.8)	123 (64.7)	128 (67.4)	149 (78.4)
Programmes				
BPHYSIO	26 (68.4)	30 (78.9)	24 (63.2)	36 (94.7)
BBET	15 (78.9)	13 (68.4)	13 (68.4)	16 (84.2)
MBBS	62 (68.9)	57 (63.3)	61 (67.8)	67 (74.4)
BPHARM	24 (64.9)	27 (73)	26 (70.3)	26 (70.3)
BOSH	38 (70.4)	37 (68.5)	42 (77.8)	44 (81.5)
BHMS	6 (66.7)	6 (66.7)	7 (77.8)	6 (66.7)
BPSY	37 (69.8)	38 (71.7)	39 (73.6)	44 (83)

The overall (unimodal + multimodal) learners' most chosen learning preferences was kinaesthetic mode of learning, which includes 81.8% of males and 78.4% of females (Table 4). Similarly for male undergraduates, visual mode of learning was the least chosen mode of learning (75.5%) while for females, the least chosen mode of learning was the auditory learning (64.7%). Overall learning preferences among undergraduates in different programmes can be seen in Table 4. The undergraduates from the BPHYSIO, BBET, MBBS, BOSH and BPSY programmes highly preferred the kinaesthetic mode of learning with percentages of 94.7, 84.2, 74.7, 81.5 and 83.0, respectively. In contrast, there was a higher preference towards the auditory mode of learning (73.0%) among BPHARM undergraduates whereas BHMS undergraduates favoured on read/write mode of learning (77.8%).

Discussion

Unimodal Versus Multimodal

This research showed that the majority of the Gen Z undergraduates at UoC preferred multimodal learning. This was supported by a previous study (Baykan & Nacar, 2007) where a majority of the students at Erciyes University preferred multimodal learning instead of unimodal learning. Besides that, this study was also compatible with other studies that used the VARK questionnaire as research instrument (Alkooheji & Al-Hattami, 2018; Lauc et al., 2014; Payaprom & Payaprom, 2020; Urval et al., 2014). This indicates that student learning may be enhanced when they are exposed to multiple modes of presentation of content. Some of the possible rationales include: undergraduates' inclination towards applying all their senses to absorb information (Slater et al., 2007), the unique characteristics of Gen Z like lack of attention (Chicca & Shellenbarger, 2018) vulnerability to distractions (Jaleniauskiene & Juceviciene, 2015), and high-tech, on-demand, hyper-connected and impatient environment in which Gen Z has grown up. Moreover, Gen Z is the first global generation with high interest in and avenues for learning (Hampton & Keys, 2016) that is also attributed to their

multimodal learning preferences. In contrast, a study conducted in three universities in Malaysia among health science and medical undergraduates depicted a higher preference for the unimodal learning style (Wong et al., 2017). Though this study also used a VARK questionnaire, the participants were only from first year and this study was conducted in 2015. There could have been a possible shift from unimodal learning to multimodal learning among undergraduates over these years.

Most Preferred Mode of Learning

Kinaesthetic learning is the highly preferred mode of learning in the present study. Previous studies (Kharb, Samanta, Jindal, & Singh, 2013; Payaprom & Payaprom, 2020) were also coherent with this finding. Kinaesthetic learners will learn superlatively by doing, experiencing, moving, and handling. They prefer hands-on activities (Jamie & Karen, 2014). It has been reported that Gen Z also inclined towards active learning (Thinnukool & Kongchouy, 2017) and learning by doing (Adobe, 2016; Barnes & Noble College, 2016; Puiiu, 2017). Moreover, Gen Z college students have a proclivity to learn practical knowledge to apply for future occupations or undertakings (Nicholas, 2019). These would have attributed more preference towards kinaesthetic learning among undergraduates in this study. The present study involved medical and health sciences undergraduates whose curriculum involves lots of hands-on sessions. This would be another reason for more preference towards the kinaesthetic mode of learning. Unfortunately, owing to present pandemic situations, many of the undergraduates have been undergoing online classes for more than one year. The educators should consider appropriate measures to include the kinaesthetic mode of learning in the online mode of teaching learning process as well.

Gender Differences in Learning Preferences

One of the main findings of this study showed that there was a significant difference between learning preferences between male and female undergraduates. Although both genders preferred multimodal learning, there was a higher preference for multimodal learning among males when compared to female Gen Z undergraduates. This finding was the same as the previous studies among undergraduates (Afshan, 2019; Veena & Shastri, 2013; Wehrwein et al., 2007). It is unclear regarding the reasons for the same. The overall highly preferred mode among both genders is kinaesthetic mode, which is similar to a previous study (Afshan, 2019) whereas the least preferred mode of learning among male and female Gen Z undergraduates was visual and auditory mode, respectively.

Influence of Programme in Learning Preferences

A majority of the Gen Z undergraduates, irrespective of programme of study, preferred the multimodal style of learning. Similarly, kinaesthetic mode of learning is highly preferred by Gen Z undergraduates in most of the programmes of study except BHMS and B. Pharm undergraduates. In conjunction with this study, a previous study among Physical Therapy and Rehabilitation and Nursing students also found a preference for kinaesthetic learning, however, in the same research, the researchers found that the Nutrition and Dietetic students preferred the auditory style (Cetin & Erel, 2018).

A majority of the Gen Z undergraduates preferred the multimodal form of learning, irrespective of gender and programme of study. Similarly, the kinaesthetic mode of learning was highly preferred by Gen Z undergraduates in most of the programmes of study except BHMS and B. Pharm undergraduates. This study's findings reveal multiple modes including the kinaesthetic mode of

delivering teaching and learning content can be considered to facilitate learning among Gen Z undergraduates.

Limitations

There are certain limitations in this study that need to be considered while trying to generalise the outcomes. There is no adequate representation of undergraduates from all the programmes. There is a possibility of response bias, since the VARK questionnaire is a self-reported measure where response may change based on the situation at the time.

Recommendations

Future studies could target a large sample of Gen Z students across Malaysia. This study could be extended among other programme students such as management, IT, and engineering undergraduates. Follow-up studies could be steered in the future, which may track the changes of learning preferences from the beginning to the end of the courses. Qualitative studies could be considered to explore the factors ascribing their learning preferences.

Conflict of Interest: The authors declare no conflict of interest.

Acknowledgement: We would like to express our gratitude to all the participants involved in this study for their support and cooperation throughout the study.

References

- Adobe. (2016). *Gen Z in the classroom—Creating the future*. adobeeducate.com/genz
- Afshan, K. (2019). Do learning styles influenced by gender: A qualitative study among physiology undergraduate medical students. *International journal of Physiology*, 7(4), 61-66. doi:<https://doi.org/10.37506/ijop.v7i4.59>
- Akram Awla, H. (2014). Learning styles and their relation to teaching styles. *International Journal of Language and Linguistics*, 2(3), 241. doi:10.11648/j.ijll.20140203.23
- Alkooheji, L., & Al-Hattami, A. (2018). Learning style preferences among college students. *International Education Studies*, 11(10), 50. doi:10.5539/ies.v11n10p50
- Barnes & Noble College. (2016). *Getting to know Gen Z - Exploring Middle and High Schoolers' Expectations For Higher Education*.
- Baykan, Z., & Nacar, M. (2007). Learning styles of first-year medical students attending Erciyes University in Kayseri, Turkey. *Advances in Physiological Education*, 31(2), 158-160. doi:10.1152/advan.00043.2006
- Cetin, S. Y., & Erel, S. (2018). Determining the learning preferences of the students of the faculty of health sciences in Cyprus International University. *SHS Web Conf.*, 48, 01026. doi:<https://doi.org/10.1051/shsconf/20184801026>
- Chicca, J., & Shellenbarger, T. (2018). Connecting with Generation Z: Approaches in nursing education. *Teaching and Learning in Nursing*, 13, 180-184. doi:10.1016/j.teln.2018.03.008
- Childs-Kean, L., Edwards, M., & Smith, M. D. (2020). Use of learning style frameworks in health science education. *American Journal of Pharmaceutical Education*, 84(7), ajpe7885. doi:10.5688/ajpe7885
- Cilliers, E. J. (2017). The challenge of teaching Generation Z. *PEOPLE: International Journal of Social Sciences*, 3(1), 188-198. doi:10.20319/pijss.2017.31.188198

- Ding, D., Guan, C., & Yu, Y. (2017). Game-based learning in tertiary education: A new learning experience for the Generation Z. *International Journal of Information and Education Technology*, 7(2), 148-152. doi:10.18178/ijiet.2017.7.2.857
- Fitkov-Norris, E. D., & Yeghiazarian, A. (2015). Validation of VARK learning modalities questionnaire using Rasch analysis. *Journal of Physics: Conference Series*, 588, 012048. doi:10.1088/1742-6596/588/1/012048
- Hampton, D. C., & Keys, Y. (2016). Generation Z students: Will they change our nursing classrooms? *Journal of Nursing Education and Practice*, 7(4). doi:10.5430/jnep.v7n4p111
- Jaleniauskiene, E., & Juceviciene, P. (2015). Reconsidering university educational environment for the learners of Generation Z. *Social Sciences*, 88(2). doi:10.5755/j01.ss.88.2.12737
- Jamie, P., & Karen, P. (2014). Different keystrokes for different folks: Addressing learning styles in online education. *Information Systems Education Journal*, 12(2), 29-37.
- Kharb, P., Samanta, P. P., Jindal, M., & Singh, V. (2013). The learning styles and the preferred teaching-learning strategies of first year medical students. *Journal of Clinical and Diagnostic Research*, 7(6), 1089-1092. doi:10.7860/JCDR/2013/5809.3090
- Lauc, T., Kisicek, S., & Bago, P. (2014). *Multimedia resources in an online course: Access and usage with respect to sensory modality*. <https://hrcak.srce.hr/129526>
- Leite, W. L., Svinicki, M., & Shi, Y. (2010). Attempted validation of the scores of the VARK: Learning styles inventory with multitrait-multimethod confirmatory factor analysis models. *Educational and Psychological Measurement*, 70(2), 323-339. doi:10.1177/0013164409344507
- Newton, P. M., & Miah, M. (2017). Evidence-based higher education - Is the learning styles 'myth' important? *Frontiers in Psychology*, 8, 444. doi:10.3389/fpsyg.2017.00444
- Nicholas, A. J. (2019). *Preferred learning methods of Generation Z*. Paper presented at the *Northeast Business and Economics Association 46th Annual Conference*.
- Ojeh, N., Sobers-Grannum, N., Gaur, U., Udupa, A., & Majumder, M. A. A. (2017). Learning style preferences: A study of pre-clinical medical students in Barbados. *Journal of Advances in Medical Education & Professionalism*, 5(4), 185-194.
- Thinnukool, O. & Kongchouy, N. (2017). Is Facebook a suitable tool in modern world technology for active learning in as regards 21st century learning? *International Journal of Emerging Technologies in Learning*, 12(10), 173-191.
- Othman, A., Abdul Rashid, M., Ismail, I., Mohamad Saad, S., Norizan, S., & Misnan, S. (2019). *Changing the learning wheel: Gen Z learning style*. Paper presented at the *International Conference on Business, Education, Innovation & Social Sciences*, Malaysia.
- Özerem, A., & Akkoyunlu, B. (2015). Learning environments designed according to learning styles and its effects on mathematics achievement. *Eurasian Journal of Educational Research*, 15(61), 61-80. doi:10.14689/ejer.2015.61.4
- Payaprom, S., & Payaprom, Y. (2020). Identifying learning styles of language learners: A useful step in moving towards the learner-centred approach. *Journal of Language and Linguistic Studies*, 16, 59-72.
- Puiu, S. (2017). Generation Z – An educational and managerial perspective. *Revista Tinerilor Economisti*, 62-72.
- Sarabi-Asiabar, A., Jafari, M., Sadeghifar, J., Tofighi, S., Zaboli, R., Peyman, H., . . . Shams, L. (2015). The relationship between learning style preferences and gender, educational major and status in first year medical students: A survey study from Iran. *Iran Red Crescent Medical Journal*, 17(1). e18250. doi:10.5812/ircmj.18250

- Slater, J. A., Lujan, H. L., & DiCarlo, S. E. (2007). Does gender influence learning style preferences of first-year medical students? *Advances in Physiology Education*, 31(4), 336-342. doi:10.1152/advan.00010.2007
- Tophat.com. (2020). *Learning style glossary*. <https://tophat.com/glossary/l/learning-style/#:~:text=A%20learning%20style%20is%20the,process%2C%20comprehend%20and%20retain%20information.&text=Auditory%20learners%20prefer%20to%20listen,audiobooks%20rather%20than%20print%20ones>
- Urval, R. P., Kamath, A., Ullal, S., Shenoy, A. K., Shenoy, N., & Udupa, L. A. (2014). Assessment of learning styles of undergraduate medical students using the VARK questionnaire and the influence of sex and academic performance. *Advances in Physiology Education*, 38(3), 216-220. doi:10.1152/advan.00024.2014
- Veena, & Shastri, S. (2013). Learning preferences among students. *IOSR Journal of Humanities and Social Science*, 15(6).
- Wehrwein, E. A., Lujan, H. L., & DiCarlo, S. E. (2007). Gender differences in learning style preferences among undergraduate physiology students. *Advances in Physiology Education*, 31(2), 153-157. doi:10.1152/advan.00060.2006
- Wong, R. S. Y., Siow, H. L., Kumarasamy, V., & Shaherah Fadhlullah Suhaimi, N. (2017). Interdisciplinary and inter-institutional differences in learning preferences among Malaysian medical and health sciences students. *Journal of Advances in Medical Education & Professionalism*, 5(4), 164-171.

Authors:

Natasha Mohd Ishak. Email: nathasha1912@gmail.com

Harikrishnan Ranganathan. Email: hari4physio@gmail.com

Kamalambal Harikrishnan. Email: nathasha1912@gmail.com

Cite this paper as: Ishak, N. M., Ranganathan, H., & Harikrishnan, K. (2022). Learning preferences of Generation Z undergraduates at the University of Cyberjaya. *Journal of Learning for Development*, 9(2), 331-339.