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LEARNING STYLES OF DIPLOMA STUDENTS AT A PUBLIC UNIVERSITY IN MALAYSIA POST COVID-19 PANDEMIC

**Noraziah Azizan^{1*}, Nor Ashikin Ab Manan², Johana Yusof³ & Iza Faradiba
Mohammad Patel⁴**

*^{1,2,3,4} Academy of Language Studies,
Universiti Teknologi MARA (UiTM), Perak Branch, Seri Iskandar Campus,
Perak, MALAYSIA*

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Corresponding Author:
noraz270@uitm.edu.my

ABSTRACT

The education system worldwide underwent a drastic change during the Covid-19 pandemic. Online distance learning or ODL was adopted to limit face-to-face interactions and minimize the spread of the contagious diseases. Educators and students had to adapt their teaching methods and learning styles respectively, during the pandemic. However, now that the world is already in the endemic phase and online classes have been replaced by face-to-face classes, the question has been raised on whether the situation has changed the way the students are learning. This study aims to investigate the learning styles of diploma students at a public university in Malaysia to determine whether their learning styles are different during and after the COVID-19 pandemic. The participants in the study are 100 diploma students at UiTM Perak. The data were collected through the distribution of questionnaire adapted from VAK (Chislett & Chapman, 2005). It was found that most of the participants are visual learners and preferred VISUAL learning style. In addition, most of the students (76%) felt that they have adapted to the changes of the learning environment during and after the Covid-19 pandemic and have changed their learning styles accordingly. To the question whether they prefer Online Distance Learning (ODL) or face-to-face learning environment, only ten (10%) of the students stated that they prefer ODL while the rest

prefer face-to-face learning environment. The findings of the research will contribute valuable insights for educators, policy makers and the learning institutions to enhance learning and teaching quality and to support the diverse learning needs of diploma students.

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1. Introduction

The COVID-19 pandemic has had a profound impact on education worldwide, making schools and universities shift to remote learning and adopt new strategies to ensure continuity of education. It has significantly affected the way students learn and leaves an impact on their learning styles. In many countries, education systems have undergone a big shift from face-to-face learning to blended learning (BL) or online learning options. Due to unexpected scenarios, most higher learning institutions including those in Malaysia were not prepared to face the changes. We are left with no option but to opt for online distance learning (ODL). Not only the lecturers but also the students faced difficulties in the era.

However, being in a difficult situation for quite some time has made teachers and lecturers as well as students gain new momentum, learn new technology and survive. As the pandemic subsides and the university has gone back to its normal function, it is expected that students' learning styles may have undergone several changes.

Individual learning styles are shaped by several factors including personal experiences, different forms of intelligence, and personality traits like a preference for solitary or group learning. Our learning style affects how we handle everyday tasks such as reading a map or cooking a meal. The VAK theory suggests that individuals have a dominant learning style, meaning they prefer one of the three modes (visual, auditory, or kinaesthetic) when it comes to processing and retaining information. Learning styles can vary from one person to another, they are typically categorised into three main types (Sreenidhi & Tay, 2017) as summarised in Table 1.

Table 1
Types of Learning Styles

Visual learners	They prefer to learn through visual aids such as charts, graphs, diagrams, and images. They benefit from seeing information presented in a clear and organised manner
Auditory learners	They learn best through listening and verbal communication. They prefer spoken instructions, discussions, and lectures. They may benefit from reading aloud or participating in group discussions.
Kinaesthetic learners	These learners learn by engaging in physical activities and hands-on experiences. They prefer to learn through touch, movement, and practical activities. They often benefit from activities that involve manipulating objects or actively participating in experiments

Chislett and Chapman (2005) further explained these categories as follows:

A. Visual learning style

It involves a preference for processing information through visual means such as images, diagrams, demonstrations, displays, handouts, films, etc. People who prefer this style often use expressions like 'show me' and 'let's take a look'. They excel at comprehending new tasks after reading instructions or observing another's actions, and they tend to follow lists and written directives.

B. Auditory learning style

It focuses on acquiring knowledge through listening, whether it is spoken words, conversations with others, or various sounds and noises. Individuals with this style frequently use phrases like 'tell me' and 'let's discuss it,' and they perform best when given verbal instructions from experts. They feel comfortable receiving spoken guidance over the phone and can easily recall song lyrics they've heard.

C. Kinesthetic learning style

It emphasises learning through physical experiences, involving activities like touching, feeling, handling, and practical, hands-on learning. Those with this preference often express themselves with phrases such as 'let me try' and 'how do you feel?' They excel at tackling new tasks by diving in and learning as they go, often preferring to experiment hands-on rather than consulting instructions.

1.1 Problem Statement

The outbreak of the COVID-19 pandemic has significantly disrupted traditional educational systems worldwide, leading to abrupt shifts in the delivery methods of instruction, mainly towards online or blended learning. After the pandemic, when universities reopen, it is expected that the system will go back to normal like before. This sudden transition may not cater to the diverse learning styles of students, potentially compromising their academic performance and engagement. This paper aims to investigate the challenges faced by students to adapt to new modes of instruction in the context of their preferred learning styles. By understanding how the pandemic has impacted students relative to their learning styles, educators can develop more effective strategies to accommodate and support diverse learners in today's environment by considering the adjustments they have made during the pandemic until now.

The research objectives of the study are:

- RO1: To identify the learning styles/preferences of diploma students at UiTM Perak university in Malaysia during and post-pandemic.
- RO2: To examine the impact of the post-pandemic COVID-19 era on students' learning styles.

Therefore, we propose two research questions to be analysed in this study:

- RQ1: What are the predominant learning styles of diploma students at UiTM Perak during and after the COVID-19 pandemic?
- RQ2: How has the post-pandemic COVID-19 era influenced or changed the learning styles of diploma students at UiTM Perak compared to their learning styles during the pandemic?

2. Literature Review

According to Sirin and Guzel (2006) as cited in Jaber (2015), during the learning process students tend to favour various ways of handling, assimilating, and engaging with information. These favoured approaches are known as Learning Styles. In addition, there is a need for educators to identify the learning styles of his or her students to find the best way to deliver their knowledge to the students and help them improve their learning process (Swales & Senior, 1999; Montgomery & Groat, 1998; Jaber, 2015).

Besides, understanding learning styles can enhance educators' comprehension of individual differences. As Pajares (1992) claimed, a teacher's beliefs shape his or her pedagogical methods. When teachers are aware of student's learning styles, they tend to be careful in lesson planning, during teaching, and in student evaluation. Moreover, according to Othman and Amiruddin (2010), embracing learning styles can potentially boost student's motivation. Additionally, another researcher, Kirby (1988) has proposed strategies to enhance the application of learning styles with flexibility and encourage a blend of various learning styles.

Mohd Jelas (2011) in his study examines the learning style of students at Universiti Kebangsaan Malaysia (UKM) and discovered that UKM students mainly prefer competitive and participative learning approaches. Students with a competitive learning preference thrive when instructors focus on tasks and are highly driven by incentives and acknowledgments. To motivate these students, universities might consider offering more grants, scholarships, or awards for accomplishments. On the other hand, those with a participative learning inclination benefit more from teamwork and joint learning environments.

Ghazivakili et al. (2014) in their study intended to find the relationship between learning styles and critical thinking of students and their academic performance. For effective learning, Kolb believed a learner requires four different abilities, which are influenced by variables like academic performance, higher education enhancement, critical thinking, and problem-solving. Furthermore, the results show there is a significant connection between learning styles, critical thinking, and academic achievement. Given the vital role of critical thinking to improve professional skills, it is suggested to use teaching performance, higher education enhancement, critical thinking, and problem-solving.

Another reference of learning style is Kolb's Learning Model. This framework classifies learners into four different groups: Activist, Theorist, Pragmatist, and Reflector. These learning styles highlight the different methods students prefer when acquiring knowledge. For instance, Activists are hands-on learners who often act before thinking about the results. Theorists, on the other hand, need to grasp and understand the underlying theory before taking action. Reflectors are those who gain knowledge through observation, listening, and self-analysis and often showing a reflective nature. Pragmatists, however, focus on testing out theories, concepts, and methods, determining how best

to implement them in real-life scenarios. To gain optimal learning, Kolb and various psychologists propose incorporating all these styles into the learning process. Using Kolb's Learning style model, Wan Mardiyatul Miza et al. (2019) found from their research that students who preferred the Pragmatist and Theorist learning styles outperformed their peers, while those leaning towards the Activist style left behind.

While Sreenidhi and Tay (2017), explore different learning styles based on the research of several prominent educators and researchers, including Fernald, Keller, Orton, Gillingham, Stillman, Montessori, and Neil D. Fleming and found that the most preferred VAK mode among participants was kinaesthetic, and the preferred teaching method was more on practical or activities. There was a positive correlation between the preferences of VAK modes and teaching methods.

As for Sharma and Alvi (2021), their research aims to understand the students' views on the changes in learning methods at higher education institutions due to COVID-19. This insight will direct essential changes in education both during and post-pandemic, highlighting the importance of active adaptation instead of simply hoping for a return to the usual teaching and learning scenario like before the pandemic. Their findings showed a notable difference in students' perceptions of learning before and after the pandemic. Students had a more positive view of blended learning before the pandemic. However, their perception was not as favourable towards the web-based learning adopted after the pandemic. The short duration might not have given students adequate time to adjust to the new teaching methods. Thus, this knowledge will steer vital educational changes throughout and following the pandemic, underscoring the urgency for forward-thinking adjustments to suit the current teaching and learning.

Cobo-Rendon et al. (2022) suggested that to successfully implement blended learning, some key elements such as developing an institutional definition, adjusting the curriculum and infrastructure, training faculty, conducting continuous assessments, and ensuring that students have access to educational resources and technologies should be implemented. They also emphasise the need for a holistic approach and adaptation to institutional orientation, teaching methods and student needs. Furthermore, for them, hybrid or blended learning is an approach that integrates new tools, approaches, and learning environments into the pedagogical and learning process. They believe that online learning is expected to play an increasingly important role in the post-covid world.

However, Oliver and Trigwell (2005) questioned the idea of BL, and they claimed that the definition of BL is vague and argued that its delivery methods led educators to focus more on teaching rather than learning. Although this critique might be somewhat stringent, it emphasises the potential pitfalls of using technology without assessing its impact on learning (Oliver and Trigwell, 2005). As such, it is essential to make sure that method should also emphasise the strategic and beneficial use of technology to aid both teaching and learning processes (Allan et al., 2019).

Norazlan et al. (2017) refer to Kolb (1976) who further classifies learning style into four types, they are "accommodator, diverge, assimilator and converger". Their study showed that there was a relationship between students' learning styles with their academic performance. This research also suggests that knowing different students' learning styles could help educators figure out the best ways to teach different groups of students.

Based on VAK learning style theory which suggests that individuals have a dominant learning style, meaning they prefer one of the three modes (visual, auditory, or kinaesthetic), a few researchers such as Yuniarti et al. (2021) who used VAK model with the combination of multimedia, Apipah et

al. (2018) who applied VAK model in their mathematics classroom, Ramadian et al. (2019) who used VAK model in their writing class. Yuniarti et al. (2021) concluded that VAK learning model could improve learning outcomes while Apipah et al. (2018) concluded that students with visual learning style perform the highest mathematical connection ability and Ramadian et al. (2019) concluded that VAK model can be used as an alternative to improve students' writing ability.

3. Methodology

This study employed purposeful sampling, and 100 diploma students were selected from different programmes at UiTM Seri Iskandar campus. All the participants were native speakers of Malay, with ages ranging between 18 and 20 years. The study included 42 male and 58 female participants. These students had enrolled in a proficiency English course at the university, which is a requirement for their diploma programme. Out of all the participants, 71 are from the Department of Built Environment Studies and Technology, while the remaining 29 are from the College of Creative Arts.

3.1 The Research Instrument

The VAK Learning Styles Self-Assessment Questionnaire, developed by Chislett and Chapman (2005) was adapted and translated into Malay for this study. This instrument is a self-reporting questionnaire created based on existing learning style instruments. Section A comprised a demographic information of the participants while Section B consists of 30 questions of the three learning style preferences to be measured: auditory, visual, and kinaesthetic. The frequency of options 'A', 'B' or 'C' chosen by the participants determines whether the students' learning styles are visual, auditory, kinaesthetic or a combination of two or three learning styles. In Section C some open-ended questions were added by the researchers to identify the participants' preferences, attitude, and their learning styles during and after the Covid-19 pandemic.

3.2 Data Collection and Analysis

The study was conducted during the March 2023 semester. The researchers had converted VAK questionnaire into a Google Form and the participants responded to the questionnaire which was distributed online by the researchers in the classrooms. The answers were analysed by adding up how many A's, B's and C's the participants had selected. Consequently, participants who predominantly choose A's were identified as having a VISUAL learning style, while those favouring B's possess an AUDITORY learning style, and those favouring C's exhibit a KINAESTHETIC learning style. Participants who chose equal number of A's, B's and C's are considered as possessing a combination of learning styles and labelled as 'AK' for Auditory and Kinaesthetic, 'VK' for Visual and 'Kinaesthetic', 'VA' for Visual and Auditory and 'VAK' for Visual, Auditory and Kinaesthetic.

4. Results

Table 2 presents the participants' demographic. A total of one hundred (100) students from two faculties at UiTM Perak, Seri Iskandar campus participated in the survey of which seventy-one (71) of them were from the Department of Built Environment Studies and Technology while the

remaining twenty-nine (29) were from the College of Creative Arts. Out of the total number of participants, forty-two (42) were males while the remaining fifty-eight (58) were females.

*Table 2
Participants' Demographic*

Department	Gender		
Built Environment	Creative Arts	Male	Female
71	29	42	58

4.1 Result from Section B

As explained in the methodology section, the frequency of options 'A', 'B' or 'C' chosen by the participants determines whether the students' learning styles are visual, auditory, kinaesthetic or a combination of two or three learning styles. Thus, the data from the questionnaire were sorted and the students were assigned to different categories as shown in Table 3.

*Table 3
Summary of Participants' Learning Style*

Learning Style	Label	Number Of Participants
<i>Visual</i>	V	41
<i>Auditory</i>	A	13
<i>C</i>	K	33
<i>Auditory & Kinaesthetic</i>	AK	3
<i>Visual & Kinaesthetic</i>	VK	5
<i>Visual & Auditory</i>	VA	3
<i>Visual, Auditory & Kinaesthetic</i>	VAK	2

Based on Table 3, the majority of the participants or 41% fall under the category of visual learning style while 33% fall under the category of kinaesthetic learning style and 13% have auditory learning style. The remaining 13% of them fall under a combination of two or three learning styles which are Auditory and Kinaesthetic (AK), Visual and Kinaesthetic (VK), Visual and Auditory (VA) and Visual, Auditory and Kinaesthetic (VAK).

4.2 Results from section C: Post Pandemic Learning Style

Out of the one hundred participants, 24% (24) felt that their learning style has not changed post-pandemic. However, most students (76%) felt that they had adapted to the changes of the learning environment and adjusted their learning styles accordingly. Most of the students who claimed that their learning styles have not changed were those who prefer to study alone. Thus, it did not make any difference to them whether the classes are conducted face-to-face or online. Table 3 provides some examples of their explanations.

Table 4
Sample excerpt for questions 1 in section C

Question 1: Adakah anda merasakan cara/gaya belajar anda berubah semasa dan selepas pandemik Covid19?
Translation: Do you feel that your learning style has changed during and after the pandemic?

Excerpt 1 *Answer: Ya. ...pembelajaran secara online membuatkan saya pasif kerana saya tidak dapat bayangkan apa yang lecture ingin sampaikan ... secara bersemuka ini sangat efektif kerana kita dapat melihat persekitaran ... demonstrasi menyebabkan saya sendiri akan lebih aktif.*
Translation: ...learning online makes me passive because I cannot imagine what the lecturers want to convey ...face-to-face is very effective because we can observe the surrounding... demonstration makes me more active

Excerpt 2 *Answer: Ya. Sekarang saya guna pelbagai sumber dan cara belajar bukan sahaja di kelas tetapi online juga*
Translation: Yes. Now I use various sources and learning method not only in class but also online

Excerpt 3 *Answer: Tidak. Kerana saya memang sentiasa belajar bersendirian*
Translation: No, because I always study alone

Excerpt 4 *Answer: Tidak. Kerana sebelum dan selepas pandemik gaya belajar tetap secara berseorangan dan cara pun masih sama*
Translation: No. Because before and after pandemic my learning style is to study alone and the way I study is still the same

To the question whether they were more motivated during (ODL) or after the pandemic (face-to face), only ten (10%) students stated that they prefer ODL while the rest prefer face-to-face. Interestingly, the reasons given by the participants who prefer ODL vary as seen from the excerpts in Table 4.

Table 5
Sample excerpt for questions 2 in section C

Question 2: Bilakah anda rasa lebih bersemangat untuk belajar ?
Translation: When do you feel more motivated to study?

Excerpt 1 *Answer : Semasa pandemic, kerana saya seorang yang lebih faham jika buat nota sendiri dan merujuk video.*
Translation: During the pandemic, because I understand the lesson better if I make my own notes and refer to the video by lecturer.

Excerpt 2 *Answer: Semasa pandemic, kerana suasana rumah yang lebih selesa dan mudah serta kurang pergerakan.*
Translation: During the pandemic, because the environment at home is more comfortable and easier and requires minimal movement.

Excerpt 3 *Answer: Selepas Pandemik, kerana kelas bersemuka lebih mudah untuk difahami dan senang untuk bertanya soalan kepada pengajar.*
Translation: After the pandemic, because during face-to-face classes it is easier to understand and to ask questions to the lecturer.

Excerpt 4 *Answer: Selepas Pandemik, bersemangat kerana mudah untuk berkomunikasi dengan pensyarah dan kawan kawan.*
Translation: After the pandemic, motivated because it is easier to communicate with lecturers and friends.

Excerpts 1 and 2 are examples of participants who feel more motivated to study during the pandemic. In excerpt 1 the respondents stated that he or she understood the lesson better by taking down notes and referring to the lecturer's video. In Excerpt 2, the participants felt that studying online at home was more comfortable and conducive. However, in Excerpt 3 and 4 the participants stated that they were more motivated during face-to-face classes because they can directly communicate with their lecturers and classmates, making learning easier.

5. Conclusion

Since the most preferred learning styles were 'visual' followed by 'kinaesthetic', it is not surprising that most of the students claimed that they prefer 'face-to-face' learning environment. They prefer seeing and interacting with the lecturers and the classmates in real life rather than in virtual environment. Participants with 'kinaesthetic' learning style prefer something that they can touch and feel rather than just hearing. Knowing the students' learning style can encourage the teachers to act on this information by adjusting their teaching styles in accordance with students' need and guide them in achieving their academic goals. Additionally, it can be concluded that many of the participants have changed or adjusted their learning styles after the pandemic. Based on their answers to the open-ended questions, although the majority stated that they prefer face-to-face learning environment, many have adopted the use of technology in their learning thanks to the exposure they received during the Covid-19 Pandemic. However, the researchers also feel that further research on Hybrid Learning Models can be carried to explore its potential since the results portray that many students still prefer face-to-face learning despite the advances made in virtual classroom technology. Further research can explore the efficacy of hybrid learning models, combining both in-person and online methods.

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Authors Contributions

Nor Ashikin Ab Manan was primarily responsible for the conceptualization and design of the study, while Noraziah Azizan was actively engaged in the comprehensive literature review. Johana Yusof and Iza Faradiba Patel led the data collection efforts. Nor Ashikin Ab Manan and Noraziah Azizan is responsible in drafting the initial manuscript, conducted statistical analyses, and provided critical input throughout the manuscript revision process.

Conflict of Interest

There is no conflict of interest associated with this publication.

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