Investigating Grade Nine Students' Preferred Learning Styles Using a Kolb's Model

Dumcho Wangdi, Sonam Tshomo, Pema Choden and Pem Tshomo

Abstract

The purpose of this study was to investigate grade nine students' preferred learning styles based on the Kolb's model. A Learning Style Inventory adapted from the Kolb's model of learning was administered to 201 students selected through maximum variation sampling method. The students' preferred learning styles were categorized into four learning styles namely i) accommodator, ii) diverger, iii) assimilator and iv) converger by calculating their mean and standard deviation. An ANOVA test and Scheffe multiple comparisons were performed to examine the relationships between the students' preferred learning styles and their grade as well as gender. The results indicated that a majority of male grade 9 students preferred assimilator learning style (M=3.37; SD=1.13) while the female students' preferred diverger learning style (M=3.49; SD=1.18). An independent samples t-test revealed that there was a statistically significant mean difference between male (M=30.29: SD=4.99) and female (M=32.58; SD=5.16) students for only accommodator learning style (p=.002) at .05 significance level. An analysis of variance showed that there was a statistically significant difference between students' preferred learning styles. A post-hoc analysis using Scheffe multiple comparison indicated that the mean score of accommodators was significantly different from diverger, assimilator and converger learning styles. However, the mean score of diverger did not differ significantly from assimilator and converger while the mean score of assimilators did not differ with converger learning style.

Key words: *Kolb's model, learning style, grade nine, learning style inventory*

Introduction

All students learn but not all of them learn in the same way (Novin, Arjomand, & Jourdan, 2003). For learning the same concept, some students may prefer listening or reading while others may learn better through reasoning or discovering through a hands-on experience. Within that complex social environment – the classroom, many of the mechanisms by which the students learn are still unknown to us. A plethora of learning style studies assert that there is an involvement of complex physiological, psychological and social processes in every learning situation.

One significant learning model proposed by Kolb (1984) is a well-known theory, which proclaims that learning occurs from our experiences of life through 'reflective observations'. He believes that the effective learning is observed when the learner progresses through a cycle of four stages namely concrete experience, reflective observation, abstract conceptualization and active experimentation of such experiences.

While Kolb's learning cycle has gained critical acclaim in exploring the preferred learning styles of the students and in developing appropriate learning opportunities, there is no study conducted to explore the students' preferred learning styles based on the Kolb's model in the Bhutanese school settings. This research was therefore, designed to fill this gap of literature by investigating the preferred learning styles of grade nine students based on the Kolb's model. By identification of their lesser preferred learning styles and strengthening them through the application of the experiential learning cycle, the students would be facilitated to perform better in their academics.

Research objectives

This study was guided by the following objectives:

i) Investigate the preferred learning styles of grade nine students using Kolb's model.

ii) Examine the relationship of students' preferred learning styles based on gender.

Literature Review

Learning Styles

Each learner has individual needs and characteristics because of their different prior knowledge, cognitive abilities, learning styles and motivation (Graf, 2007). Such individual differences are crucial that it has a bearing on their learning process and preferences. All students learn but they all learn in a different way. These different ways of learning referred to as learning styles (Novin et al., 2003) thus, influences the learners in perceiving and processing the information.

Recent educational studies have emphasized the significance of discovering and understanding the preferred learning styles of the learners. Knowing the preferred learning styles can be beneficial in terms of employing methods that can further improve the rate and quality of learning. When the teaching style does not match with their learning styles, the learners find it challenging to adjust with the dominant kind of learning style they possess. However, learning is much easier and efficient if the learning styles of students are incorporated in the learning environment (Graf, 2007). On the contrary, learning styles which are not supported by the learning environment may experience problems in the learning process (Felder & Brent, 2005).

Kolb's Experiential Learning Style

One of the most influential learning style in the field of education is Kolb's experiential learning style. A typical presentation of Kolb's learning model is conceived as a four-stage cycle (see Figure 1). Kolb's model considers concrete experience as the basis for observations and reflections (Baker, Robinson, & Kolb, 2012). These observations are used to form abstract concepts and generalizations, which further becomes the basis for testing implementations of concepts in new

situations. Testing implementations results in concrete experience, which closes the learning cycle.

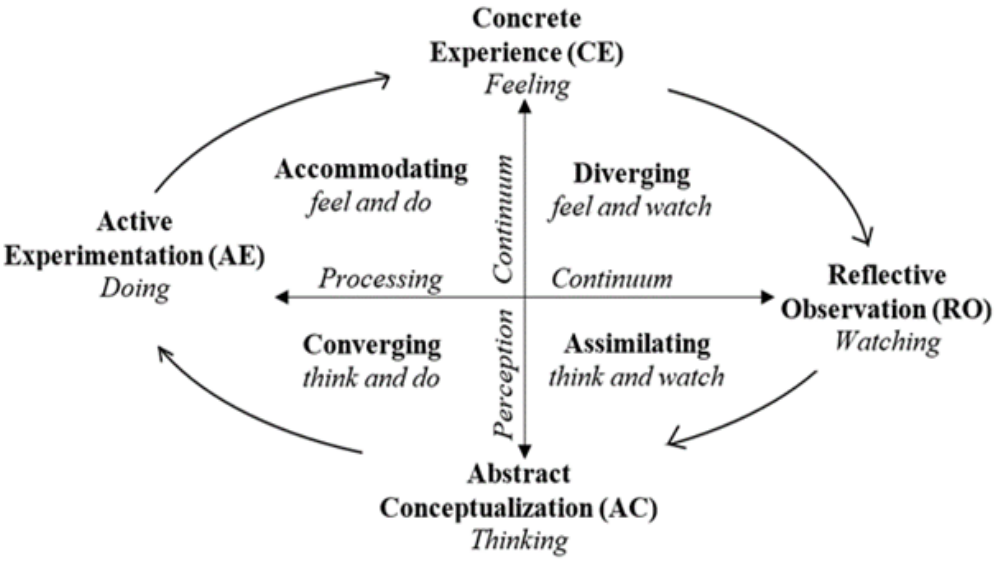

Figure- 1: Kolb's experiential learning cycle (Kolb, 1984; Kolb & Kolb, 2008)

Kolb's learning model comprises of four learning styles: a) diverging, b) assimilating, c) converging and d) accommodating (Joy & Kolb, 2009; Kolb & Kolb, 2005, 2008).

a) *Diverging (feeling and watching)*

Divergent learners prefer to watch rather than do but use imaginations to solve problems. Being sensitive, they view concrete situations from several different perspectives and viewpoints. Divergent learners are better in situations that needs generation of ideas, brainstorming or gathering information. Such learners prefer to work in teams, listen with an open mind and accept personal feedback.

b) *Assimilating* *(watching and thinking)*

The learners with an assimilating preference are guided with logical and concise approach of solving things. They are interested more on ideas and concepts than people. Such learners are attracted to logically sound theories than approaches based in practical workings.

c) *Converging* (doing and thinking)

The learners with a converging learning style can solve problems or use their learning to find solutions to solve practical issues. They prefer technical tasks over social or interpersonal matters. Such learners are fond of experimenting with new ideas and work with practical applications.

d) *Accommodating* (doing and feeling)

The Accommodating learning style is 'hands-on,' and relies on intuition rather than logic. These people use other people's analysis, and prefer to take a practical, experiential approach. They are attracted to new challenges and experiences, and to carrying out plans. They employ less of logical analysis because they depend on others for information. Accommodator refers to a person who favors Concrete Experiencing and Active Experimentation learning dimensions (i.e., a person who prefers to perceive information from feeling and process it by doing) (Novin et al., 2003).

Educational Implications of Learning Styles

Learning styles research has given educators new directions in redesigning the classrooms to better meet the needs of the students. One effective way to do so is by learning about different learning styles. The more teachers understand their students learning styles, the better they can be at helping them learners. The teachers can be able to create learning activities to suit their students' preferred learning styles only if they really know about how their learners learn (Novin et al., 2003; Buaraphan, 2015).

Kolb's (1984) learning model is largely employed in education to critically evaluate the learning provision typically available to students and to develop more appropriate learning opportunities. It allows the classrooms to be open to more than one approach to intellectual work. With such constructivist student-centered approach-based model, any activities designed and carried out in the classrooms are in ways that engages each learner in the manner that suits them best. In such situations, students can be substantially helped to learn more effectively by the identification of their lesser preferred learning styles and strengthening the dominantly preferred learning style.

When individual differences in perceiving and processing information is not considered using the learning approach they prefer, at any one point in time the students in a class may experience some amount of discomfort, disinterest, or anxiety (Felder & Spurlin, 2005; Novin et al., 2003). Students who face difficulty in learning may give up on putting efforts for learning and thus become so disenchanted and failure-prone (Novin et al., 2003). But once the teacher master the ways to appeal to the needs of all learners, it can not only improve the learning environment but can also help in boosting the confident of the learners by making the learning easy. Teaching and learning process can be dialogic and communal including a variety of active learning techniques (Montgomery & Groat, 1998). In general, the application of learning styles in education has been to improve the immediate and long term results of general teaching-learning episodes (Curry, 1990).

Methodology

Sampling

Using a maximum variation sampling method, 201 (male=87, female=114) grade nine students studying in one of the higher secondary schools in western Bhutan were involved in this study.

Instruments

The data was gathered using the Learning Style Inventory modified into Likert scale-based items. The Kolb learning style inventory is an instrument 'designed to measure the degree to which individuals display different learning styles' (Joy & Kolb, 2009). The inventory required the respondents to rank four sentence endings corresponding to the four learning modes – accommodator, diverger, assimilator and converger.

Data collection and analysis

Following proper research procedures and clearance such as seeking approval from the head of the school to conduct the study, the participating students were asked to complete the informed consents forms on a voluntary basis. The students were made to respond to the items included in the Kolb's learning inventory designed in the Likert scale format. The items were rated as 'never', 'rarely', 'sometimes', 'often' and 'always' corresponding to the scores as 1, 2, 3, 4 and 5 respectively. The data obtained from the study was analysed using a descriptive statistic such as finding the mean, and standard deviations for each learning styles in terms of gender and grades. The relationship between students' learning styles based on their grade levels and genders were examined using the one-way analysis of variance and t-tests. The mean difference between students' preferred learning styles based on their grades were also tested using the Scheffe multiple comparisons at the statistical significance level of .05.

Results and Discussions

The results of this study are presented into two sections: 1) grade nine students preferred learning styles using a Kolb's learning model and 2) relationship between students' preferred learning styles with their grades and gender.

Grade nine students preferred learning styles using a Kolb's learning model

The values reflected in the Table 1 indicate the means and standard deviations of the students' preferred learning styles. The findings indicated that a majority of male grade 9 students preferred assimilator learning style (M=3.37; SD=1.13) over accommodator (M=3.03; SD=1.04), diverger (M=3.36; SD=1.14) and converger (M=3.27; SD=1.11) learning styles. The female students were inclined more towards diverger (M=3.49; SD=1.18) kind of learning styles over accommodator (M=3.04; SD=1.05), assimilator (M=3.33; SD=1.14) and converger (M=3.36; SD=1.13). This finding was in keeping with the study by Morris (2010) which conducted with 123 students in Nebraska, Lincoln. The female students specifically preferred the diverging learning style than males (Morris, 2010).

Table 1: ***Students' preferred learning styles based on Kolb's learning model***

	Accommodator		**Diverger**		**Assimilator**		**Converger**	
Gender	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Male	3.03	1.04	3.36	1.14	3.37	1.13	3.27	1.11
Female	3.04	1.05	3.49	1.18	3.33	1.14	3.36	1.13

The dissimilarities in the mean score of different learning styles for both the gender highlights the fact that different students prefer learning uniquely (Munir, Ahmad, Hussain, & Ghani, 2018). In other words, in the process of learning, different styles or ways are used by the students in receiving and managing information (Leasa, Batlolona, Enriquez, & Kurnaz, 2018). A study by Morris (2010) further corroborates the findings that, of 123 student participants, a majority of the students were observed to be accommodator followed by diverger, converger and assimilator learning style.

The variations in the students' preferences of learning styles may be accredited to several reasons such as environmental factors or the personality of the teacher. Because of our hereditary makeup, the past life experience as well as the demands of the present environment, learning styles that put emphasis on some learning abilities over others are developed (Kolb, 1981; Nulty & Barrett,

1996). Learning environments relevant to the students' learning process motivate their learning and thus develop appropriate learning behavior (Leasa et al., 2018).

Relationship between students' learning styles based on gender

The null hypothesis (H_0) for this study assumed that the mean score of the students' preferred learning styles based on gender would be the same i.e. $H_0 = \mu1 = \mu2$ where, $\mu1$ and $\mu2$ are the population means of the male and female group respectively.

At the significance level of .05, the independent-samples t-test revealed a statistically significant mean difference between male and female students for accommodator learning style at $t(199) = -3.161$, $p < .05$ as shown in Table 2. Hence, the null hypothesis for this learning style was rejected. An examination of the group means for the male and female students for other learning styles observed that there was no statistical significant difference. For these learning styles, the alternative hypothesis was accepted.

Table 2: *Students' preferred learning style based on gender*

Learning style	Gender	N	Mean	SD	F	Sig. (2-tailed)
Accommodator	Male	87	30.29	4.995	.252	.002*
	Female	114	32.58	5.166		
Diverger	Male	87	33.56	5.020	.906	.180
	Female	114	32.52	5.772		
Assimilator	Male	87	33.70	5.859	1.38	.083
	Female	114	32.32	5.352		
Converger	Male	87	32.71	4.324	1.51	.148
	Female	114	31.71	5.202		

* The mean difference is significant at the 0.05 level

Findings similar to this study were also reported in several other studies that are conducted under varied contextual settings and conditions. Although they have used different learning style inventory, the major findings of the study by Munir, Ahmad, Hussain and Ghani (2018) and Natsir, Yusuf and Huri (2016) have also measured a gender-wise difference in the students' preference of learning

styles. In the study which engaged 745 secondary students, Munir, Ahmad, Hussain and Ghani (2018) observed that male and female students preferred different learning styles which was of course, not statistically significant to their academic achievement. Similarly, Natsir et al. (2016) reported that male students' language learning styles differed from female students.

One-way analysis of variance with post-hoc tests

A one-way between-groups analysis of variance was performed to examine the statistical significance between the students' preferred learning styles. There was a statistically significant difference at the $p<.05$ level for the mean scores of the students' preferred learning styles [$F(3, 800)=23.589$, $p=.000$] as indicated in the Table 3.

There is indeed significant evidences in the literature that suggest the variance of students' preferred learning styles and approaches to study (Kolb, 1981). While students learning styles are determined by the specific learning environment that they are engaged in, it is largely influenced on how stable or dynamic the factors are in that learning context. Studying behaviours influenced by relatively stable factors such as students' personal attributes, some characteristics of environment or continual exposure to particular modes of discourse are stable. Conversely, students' studying behaviours are transient when they are influenced by transitory environmental demands or short-term objectives such as the examination burden felt in the school. Since the concurrence of both stable and transient influences are inevitable, the choice of students' learning behaviour at any specific time is influenced by the balance between the different factors and the students' individual preferences (Nulty & Barrett, 1996).

Table 3: *Analysis of variance test for the students' preferred learning styles*

Source of variance	Sum of Squares	df	Mean square	F	p-value
Between Groups	1818.279	3	606.093	23.589	.000*
Within Groups	20555.343	800	25.694		
Total	22373.622	803			

*The mean difference is significant at the 0.05 level

Post-hoc comparisons using the Scheffe multiple comparisons indicated that the mean score of accommodator was significantly different from diverger, assimilator and converger learning styles as shown in Table 4. The mean score of diverger did not differ significantly from assimilator and converger while the mean score of assimilator did not differ with converger learning style.

Table 4: ***Scheffe multiple comparisons of the students' preferred learning styles***

Grade level (I)	Grade level (J)	Mean difference (I-J)	Std. Error	*p*
Accommodator	Diverger	-3.995	.506	.000*
	Assimilator	3.159	.506	.000*
	Converger	2.856	.506	.000*
Diverger	Accommodator	3.995	.506	.000*
	Assimilator	.836	.506	.435
	Converger	1.139	.506	.167
Assimilator	Accommodator	3.159	.506	.000*
	Diverger	-.836	.506	.435
	Converger	.303	.506	.948
Converger	Accommodator	2.856	.506	.000*
	Diverger	-1.139	.506	.167
	Assimilator	-.303	.506	.948

*The mean difference is significant at the 0.05 level

Conclusion

Understanding how students learn in the classroom must be a fundamental part of any educational enterprise. Apart from facilitating the teacher to adopt appropriate

pedagogic strategies, it also assists the students to understand the individual and better approach to learning that are potentially built on their own strengths, weaknesses and most importantly the preferences.

Besides helping them identify their preferred styles, it is equally pertinent for the teachers to comprehend the implications of uncovering students to diverse learning styles. While some may prefer learning to their best by feeling, few may favor learning through watching, thinking or by doing. However, in all of these approaches, students require to commit their abilities to retain the information into their memory for a long duration. While some learning styles are typically stronger and prominent in one area than the other, drawing up the right and preferred modality of learning and capitalizing on its strengths must be a prerequisite for any educational venture. Even by identifying the students' lesser preferred learning style, it would considerably enable teachers to figure out some approaches in strengthening them through the application of the different learning styles or modifying the modus operandi to perform academically better.

Critical to the students' academic success and achievement is diagnosing the contributing factors that are perilous to them in any magnitude. By considering only the students' preferred learning style – a trend that is still existent in our classrooms, it connotes to the fact that teachers are directed towards reinforcement of the students' strength and approaches that they are good at. Indeed, an equally damaging fact is that we are ignoring the students' weaknesses – areas in which it is imperative that they progress significantly. Such educational endeavors would facilitate students better prepare for accommodating and adjusting to any learning environment that may demand learning styles that they are weak at.

This study investigated grade nine students' preferred learning styles using Kolb's model and also examined whether it was influenced by their gender. Although four learning styles as delineated in the Kolb's model was revealed, a majority of the grade nine students demonstrated diverger learning style over

accommodator, assimilator and converger learning styles. Findings such as this accentuates the importance of considering pedagogic strategies that can encompass varied learning styles even for a single grade category. Most specifically, in the context of this finding, it draws an attention on providing learning experiences for students' that capitalize on diverging learning style.

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