

Learning Styles, Teaching Strategies and Academic Achievement among some Psychology Undergraduates in Barbados

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Learners process incoming information in different ways; hence, the instructors need to vary their methods of teaching to ensure that all students learn. This study investigated the learning preferences (visual, auditory, kinaesthetic), the teaching strategies (videos, games, role-play, discussion, group work, clarification pauses, five-minute-paper, discussion forum and glossary activity) and their influence on the academic achievement of 171 undergraduate Psychology students at the University of the West Indies, Cave Hill Campus, Barbados. The participants completed three self-report instruments: a) Active Learning Strategies Questionnaire, b) Learning Style Survey (VAK) and c) Academic Achievement Scale. Findings revealed students' preferences for visual, auditory, kinaesthetic and multiple modes of learning styles and the majority of the students benefited from the learning strategies utilised in the classroom. Additionally, the teaching strategies and learning styles contributed 20% ($R^2 = 0.20$) to the variance in academic achievement and this was statistically significant ($F(2,168) = 21.04, p < .05$). These findings discussed the importance of utilising different teaching strategies to accommodate different learning styles and promote students' academic achievement in Psychology.

Keywords: *Teaching strategies, Learning styles, Psychology, Academic achievement, Student Learning Outcomes (SLO's)*

Introduction

There are myriad possible ways through which learners process incoming information from the environment. It is believed that most people favour some particular method of interacting with, taking in, and processing stimuli or information thereby exhibiting distinctive behaviours suitable to allow them to learn. For quite some time now, educators in all fields are becoming increasingly aware of the critical importance of understanding how individuals learn perhaps because this impacts the teaching strategies, academic performance and learning outcomes (Brady 2013, Tulbure 2012). Learning style as a theory has provided some valuable insights into learning in both academic and other settings, therefore investigators have described it in various ways such as: *distinctive behaviors which serve as indicators of how a person learns from and adapts to his/her environment, and provide clues as to how a person's mind operates* (Gregorc, 1979); *an individual's preferred approach to organizing and presenting information* (Riding & Rayner, 1998) and *a reflection of concern with the application of cognitive style in a learning situation* (Riding & Cheema, 1991). Additionally, learning styles refer to how individuals

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process, focus, make information meaningful, and gain new information in order to translate it into building new skills (Dunn & Griggs, 2000; Wooldridge, 1995). Fardon (2013) further views learning style as a stable preference that is used by individuals to effectively organise, then process and develop their understanding of any learning challenge, task or situation thus adding an element of “stability” in his definition. The general consensus here is that there exists a multitude of learning styles.

Similarly, just as the learners learn in different ways, so also teachers teach in different ways. In fact effective teaching requires flexibility, creativity and responsibility in order to provide an instructional environment able to respond to the learner’s individual needs (Tulbure, 2012) and the attainment of good academic achievement and educational outcomes (Fayombo, 2014). Moreover, most students learn best when the style of presentation is aligned with their preferred learning style. It is important for teachers to understand the students’ learning styles and also for students to understand their own learning styles. By understanding different learning styles, teachers may gain insights into ways of making academic information more accessible to diverse groups of learners and an increased awareness of individual learning styles can help educators impart new information in a memorable way (Brady, 2013). Likewise, if students are aware of their preferred learning styles they will be able to recognise their strengths and weaknesses, by doing this, they can then develop strategies for effective learning.

However, one of the persistent challenges and problems that university teachers are facing is related to matching the teaching strategies with the students’ learning styles for effective learning. Though teaching is a useful means of transmitting and sharing knowledge, it does not however always result in learning; this can be seen clearly in the painful disparity between what we think we have effectively taught and what students indicate they have learned on the examination papers. Is it possible to identify the most appropriate teaching strategies for each learning style? If yes, can matching these two learning-related concepts result in improved student academic achievement and learning outcomes? These and more are the concerns of the present study. It is expected that instructions developed with an awareness of different learning styles may help improve the information assimilation and learning experiences of the students.

Learning styles, theories and teaching strategies

The preferred way in which an individual approaches a task or learning situation, the learning/cognitive style or approach or strategy, has been characterised and explained in several ways based on a variety of theoretical models. Riding and Cheema (1991) proposed a broad categorisation of style according to two fundamental dimensions representing the way in which information is processed and represented: wholist/analytic and verbaliser/imager; Riding and Rayner (1998) considered learning style within the framework of personality-centred, cognitive-centred and learning-centred approaches; two additional examples of specific theories founded in the approaches to learning style model are Kolb’s Experiential Learning Theory which focuses on grasping and transforming experiences (Kolb & Kolb, 2009) and the Perceptual Learning Styles Theory which deals with multiple modality preferences and how individuals interact with information and conduct learning tasks (Davis, 2007). Other theorists commonly provide an overview of various models generally referred to as VAK Visual-Auditory-Tactile/Kinesthetic (or Kinaesthetic); but alternatively by extension referred to as VAP (Visual-Auditory-Physical), VARK (Visual-Auditory-Reading-Kinesthetic) or VACT (Visual-Auditory-Kinesthetic-Tactile) (Felder, 1996; Felder & Brent, 2005; Fleming, 2001; Wooldridge 1995). These authors offer a composite view of several approaches and at the same time provide simple ways to explain and

understand learning styles; that we process information through our sensory modalities – visual, auditory and kinaesthetic; most people possess a dominant or preferred learning style; however some people have a mixed and evenly-balanced blend of the three styles and finally that no-one has exclusively one single style or preference. The present study adapted the VAK Visual-Auditory-Tactile/Kinesthetic (or Kinaesthetic) to assess the participants' learning styles and categorise them into the different modes of learning styles.

A thorough examination of the aforementioned models reveals the multiplicity and complex nature of learning styles thereby necessitating varieties of teaching strategies to address this wide array of behaviours involved in processing information when learning.

Teaching or instructional strategies are techniques teachers use to help students become independent, strategic learners. These instructional strategies become learning strategies when students independently select the appropriate ones and use them effectively to accomplish tasks or meet goals (Alberta Learning, 2002). In the past, research on learning and teaching in universities has focused on the teacher's behaviour rather than the learners'. However, some studies indicate that what the students do in order to learn such as adopting different methods of interacting with the learning materials is of greatest importance (Dunn, & Griggs, 2000; Shuell 1986). As a result, educators have developed "learner-centred" or "student-centred" pedagogy that has significantly influenced our understanding of university learning and teaching (Fayombo, 2014; Felder & Brent, 2005; Yoder & Hochevar, 2005). These strategies include: brainstorming, case studies, debates, discussions, flipped classroom/blended learning, group work, questioning, simulations, role plays, games, video simulations among others utilised to actively engage learners in the learning process and achieve educational outcomes.

Learning styles, teaching strategies, student learning outcomes and academic achievement

Some investigators confirmed that the alignment of teaching strategies and learning styles has a positive impact on the academic achievement of students. For example, Tulbure (2012) found significant differences between the achievement scores obtained by three categories of learners (convergers, divergers and accommodators) from two faculties of a Romanian University after the cooperative learning strategy was implemented. Similarly, Damrongpanit and Reungtragu (2013) reported significant differences between different matching conditions of students' learning styles and teachers' teaching styles after comparing the academic achievement of 3,382 ninth-grade students. In addition, Al-Saud (2013) revealed a significant difference in the mean values of GPA in relation to the first-year dental students' learning style preferences with students who have a single learning style preference having a lower mean GPA than those with multiple (quad-modal) learning style preferences. Evidence also abounds that matching teaching strategies and learning styles has a positive impact on the academic achievement and learning outcomes and that the match of teaching and learning styles in tertiary learners' second language acquisition can effectively improve students' achievement (Arthurs, 2007; Liu & He, 2014); motivation (Bell, 2007) and attitudes toward learning (Felder, 1996). On the other hand, a number of studies have revealed that matches between students' learning styles and instructional strategies did not affect the students' learning performance (Akdemir & Koszalka, 2008; Fardon, 2013; Massa & Mayer, 2006).

Thus, the issue of matching learning styles with teaching strategies and the effect on academic performance continues to be inconclusive, hence there is need for further investigation. Previous research findings suggest that the match of teaching and learning styles will promote the learning and educational effectiveness. "If the two types of styles are consistent, it's obvious

that the teacher's teaching styles match with the students' learning style, otherwise, they mismatch or unmatch" (Liu, 2007). Despite the fact that these academic-related variables have received a considerable degree of attention within the educational literature over the past two decades, not much was done to find out the learning styles of the Psychology students at the UWI, Cave Hill Campus, and the influence that this may have on their academic achievement and learning outcomes. It is against this backdrop that this study was conducted.

Present Study

The purpose of this study therefore was to investigate the learning styles, teaching strategies and their influence on academic achievement among some undergraduate Psychology students at the University of the West Indies, Cave Hill Campus. The researcher is also interested in finding out whether any particular teaching strategy style will match a particular learning style more so when previous research findings have shown that the match of teaching and learning styles can improve tertiary education students' academic achievement (Arthurs, 2007; Felder & Brent, 2005; Rogers, 2009) and exert positive influence on their motivation of and attitudes toward study (Bell, 2007; Tulbure, 2012). Hence the researcher's choice of active learning strategies to ensure that the different learning styles were addressed for academic achievement and the attainment of Student Learning Objectives (SLOs). An SLO according to this study refers to a statement of what a learner is expected to know, understand and/or be able to demonstrate at the end of a period of learning (Kennedy, Hyland, & Ryan, 2012).

Research Questions:

The following research questions were addressed in this study:

- i) *What are the teaching strategies utilized during the Psychology lecture?*
- ii) *Which learning styles exist among the students?*
- iii) *Which teaching strategies will be preferred by visual, auditory and kinaesthetic learners?*
- iv) *What are the mean differences in the academic achievements of the visual, auditory and kinaesthetic learners?*
- v) *Are there statistically significant differences in visual, auditory and kinaesthetic learners' academic achievements?*
- vi) *To what extent will teaching strategies and learning styles predict the student's academic achievement?*

Method

Participants

The participants were 171 Psychology undergraduate students who enrolled in a Learning Theory and Practice Course at The University of the West Indies, Cave Hill Campus. Their ages ranged between 18-60 years ($M = 39$ years, $SD = 1.68$). There were 25% ($n = 43$) males and 75% ($n = 128$) females, 58% ($n = 99$) were from the Faculty of Social Sciences; 42% ($n = 72$) from the Faculty of Humanities & Education; Pure & Applied Sciences.

Measures

Three instruments were used for data collection in this study:

1. VAK test (Visual/Auditory/Kinaesthetic) was administered to the learners to categorise them into different learning styles and to give each individual an idea of their perceived favoured learning-style and to encourage them to think on a broader level than simply passing exams as previously suggested by Fardon (2013). The main reason the VAK was chosen was because it is well recognised, straightforward and quick to perform, and its results are easily understood (Businessballs.com, 2012; Liu, 2007). The instrument consists of 54 items; 18 items on each of the three learning styles.
2. Active Learning Strategies Questionnaire was the second instrument and it was used to measure the teaching strategies.

This instrument was chosen because earlier research findings have proven the teaching strategies in the instrument to be effective in promoting student engagement, student learning outcomes and academic achievement (Fayombo, 2014a; Fayombo, 2014b; Felder & Brent, 2005). It has three sections: Section A comprises the demographic variables such as gender, faculty/department, year of study, nationality, age, etc. Section B consists of seven close-and-open-ended questions designed to find out whether the students participated in the different classroom and online activities. Items include:

- *Did you role play during the lectures? Yes/ no*
- *If yes how many times? _____*
- *If no, why not? _____*

Section C consists of ten subscales with 60 items designed to measure the different active learning strategies (Power Point presentation, videos, discussion, games, clarification pauses, role play, one-minute-paper, group work, glossary activities and discussion forum); nine out of the ten subscales (videos, discussion, games, clarification pauses, role play, one-minute-paper, group work, glossary activities and discussion forum) were selected for this study; there were six items in each subscale with three positively and three negatively worded items thus:

Videos

- (i) *Videos create mental images of the topics taught*
- (ii) *Watching videos during lectures is a waste of time*

Discussion Forum

- (i) *Discussion forum is engaging for me online*
- (ii) *Discussion forum is a repetition of class activities*

All the items were measured by a modified 4-point Likert scale response anchors ranging from strongly agree to strongly disagree with corresponding scores of 4, 3, 2, and 1. All the negative items were reversed during analysis. The items were generated during the review of literature and the initial versions were given to experts for suggestions and comments before coming up with the final version. The reliability of the instrument was ascertained by carrying out a pilot study among some psychology students. The instrument yielded the following Cronbach's Alpha reliability coefficients for the different subscales as shown in Table 1:

Table 1

Alpha Reliability Coefficients of Active Learning Strategies with 9 subscales (N = 30)

Sub Scales	Alpha Coefficients	No of Items
Videos	0.84	6
Role Play	0.77	6
Discussion Forum	0.72	6
Glossary	0.74	6
Group work	0.75	6
Games	0.85	6
Discussions	0.83	6
Five-minute-paper	0.70	6
Clarification pauses	0.81	6

These alpha reliability coefficients of the nine subscales ranging from 0.70 to 0.84 indicated that the instrument has high internal consistency and the validity was ascertained by the choice of items which were subjected to internal consistency analysis (Cronbach's Alpha), which is an index of item homogeneity and an indication of construct validity.

The third instrument is the Academic Achievement Scale which has three components:

- i) *Students' grades in coursework*
- ii) *Students' grades in semester examination*
- iii) *Students' Learning Outcomes*

Grades were obtained from the students' knowledge of the topics covered in PSYC 2009: Learning Theory and Practice Course during the semester. The validity of the grades was ascertained by ensuring that the questions in the three components measured what they purport to measure. The initial version of the examination questions was given to the internal examiner who is an expert in the field for vetting before coming up with the final version. The Student Learning Outcomes Assessment Scale was used to assess the SLOs specified to be achieved using active learning strategies in the classroom. SLOs are statements of what is expected that the student will be able to do as a result of learning the activity (Jenkins & Unwin, 2001) and it is important to define outcomes as clearly and explicitly as possible. Thus, the learning outcomes in this study were specific and were stated in measurable terms, they were specified to measure the students' knowledge of the theories discussed during the lectures.

Procedure and ethics

Informed consent of the students to participate in the survey was obtained. The students were briefed of the purpose of the research and that they were free not to participate in the study. The students filled out the VAK Learning style survey and the Active Learning Strategies Scale in their lecture hall with the help of three research assistants who were tutored in the administration of the instruments which lasted for approximately 10 minutes. The researchers took time to brief the participants on the process for answering the items in the questionnaire and they were told that it was not for examination purposes but for research and that the information would remain confidential. The researchers ensured that all of the items in the instrument were properly completed and the questionnaires were collected immediately after the participants had finished.

Grades were obtained from the students' knowledge of the topics covered in PSYC 2009: Learning Theory and Practice Course during the semester.

Method of Data analysis

The data collected were entered into SPSS; Descriptive Statistics, ANOVA and Multiple Regressions Analysis were conducted.

Results

Research Question 1: What are the teaching strategies utilised during the lecture?

Table 2

Descriptive Statistics showing the teaching strategies utilised during the lecture (N = 171)

Variables	Minimum	Maximum	Mean	Standard Dev
Discussion	12.00	24.00	20.25	2.57
Groupwork	5.00	20.00	14.19	3.12
Role play	12.00	24.00	19.16	2.79
Video	14.00	24.00	20.30	2.58
Games	10.00	20.00	16.95	2.42
Five-minute-paper	9.00	20.00	14.44	2.38
Clarification pauses	11.00	20.00	16.35	2.30
Discussion Forum	10.00	20.00	14.94	2.72
Glossary Activities	10.00	20.00	15.37	2.56

The results in Table 2 reveal the different learning strategies utilised during the lectures with video and discussion having the highest mean scores while group, five-minute-paper and the discussion forum have lower mean scores indicating the students have higher preference for some strategies when compared with others.

Research Question 2: Which learning styles exist among the students?

Table 3

Descriptive Statistics showing students' learning styles (N = 171)

Variables	Frequency	Percent	Mean	Standard Dev
Visual	89	51	64.90	10.78
Auditory	37	21	66.69	9.95
Kinaesthetic	25	14	64.72	7.95
Bimodal: Visual & Auditory	9	6	66.89	11.66
Bimodal: Visual & Kinaesthetic	2	2	66.93	6.36
Bimodal: Auditory & Kinaesthetic	7	4	75.75	6.56
Multimodal: Visual, Auditory & Kinaesthetic	2	2	65.58	9.99
Total	171	100		

As shown in Table 3, seven types of learning preferences emerged from this study: visual learning style topped the list with 51%; followed by auditory (21%); kinaesthetic (14%); three types of bimodal preferences also emerged: visual and auditory (6%); visual and kinaesthetic (2%); auditory and kinaesthetic (4%); and finally multimodal visual and auditory and kinaesthetic (2%). This result indicates that students have learning preferences and that half of the sample size is visual learners.

Research Question 3: Which teaching strategies will be preferred by the visual, auditory and kinaesthetic learners?

Table 4

Descriptive Statistics showing the mean scores for students' preferred teaching styles (N = 171)

Learning Styles	Discussion	Group	Role play	Video	Games	One minute paper	Clarification Pauses	Discussion forum	Glossary Activities
Visual (n=89)	19.67	14.31	18.93	20.00	16.45	14.31	16.17	14.67	15.28
Auditory (n=37)	21.08	13.81	19.78	20.68	17.35	14.54	16.65	14.65	15.41
Kinaesthetic (n=25)	20.76	14.28	19.28	20.52	17.68	14.76	16.64	15.80	15.60
Bimodal: Visual & Auditory (n= 9)	20.11	14.56	18.67	20.22	17.11	13.78	15.78	15.11	15.44
Bimodal: Visual and Kinaesthetic (n=2)	21.00	15.00	20.50	22.00	16.50	15.00	15.00	14.50	13.50
Bimodal: Auditory & Kinaesthetic (n=7)	20.57	14.14	18.43	20.57	17.71	14.86	16.86	16.57	15.29
Multimodal: Visual, Auditory & Kinaesthetic (n= 2)	23.00	12.50	19.50	21.50	19.5	15.50	17.50	15.00	17.50
Total (n=171)	20.25	14.19	19.16	20.30	16.95	14.44	16.35	14.94	15.37

Table 4 displays students' preferences for the different teaching strategies thus: visual learners have highest preference for video ($n=89$; $M= 20.00$); auditory learners have highest preference for discussion ($n= 37$; $M= 21.08$); interestingly, kinaesthetic learners prefer discussion most ($n= 25$; $M=20.76$); bimodal - visual and auditory learners prefer video most ($n=9$; $M= 20.22$); bimodal - visual and kinaesthetic also prefer video most ($n=2$; $M= 22.00$); bimodal - auditory and kinaesthetic learners have greatest preference for both discussion and video; ($n=7$; $M= 20.57$); finally, the multimodal learners – visual, auditory and kinaesthetic learners prefer discussion most ($n=2$; $M= 23.00$).

These findings indicate that students have preferences for teaching strategies as well.

Research Question 4: What are the mean differences in visual, auditory and kinaesthetic learners' academic achievements?

Table 5

Descriptive Statistics showing students' academic achievements (N = 171)

Learning Styles	Total (Course- work & Exams)	Coursework	Exams	SLOs	Overall (C/W, Exams & SLOs)
Visual (n=89)	64.90	25.22	39.69	19.71	84.61
Auditory (n=37)	66.69	25.99	40.70	20.59	87.28
Kinaesthetic (n=25)	64.72	25.96	38.76	19.36	84.08
Bimodal- Visual & Auditory (n= 9)	66.89	26.22	40.67	20.33	87.22
Bimodal-Visual and Kinaesthetic (n=2)	65.00	28.00	37.00	19.50	84.50
Bimodal - Auditory & Kinaesthetic (n=7)	66.93	23.36	43.57	23.29	90.21
Multimodal- Visual, Auditory & Kinaesthetic (n= 2)	75.75	30.75	45.00	26.00	101.75
Total (n=171)	2.57	25.57	40.00	20.10	85.68

The findings in Table 5 reveal the mean differences in the academic achievement of the visual, auditory and kinaesthetic learners. Interestingly, the multimodal learners scored the highest means in all the different components of academic achievement and overall indicating that multiple ways of processing information can enhance learning. It is also very amazing to see the mean scores of the visual, auditory and kinaesthetic learners are very close for all the components of academic achievement indicating that all the three learning preferences are equally important in learning.

Research Question 5: Are there statistically significant differences in the visual, auditory and kinaesthetic learners' academic achievements?

In order to find out whether the mean differences in the academic achievement of the students are statistically significant, one way ANOVA was conducted. The results are shown in table 6.

Table 6

ANOVA table showing the differences in students' academic achievement (N = 171)

		Sum Squares	of Df	Mean Square	F	Sig.
Coursework	Between Groups	124.758	6	20.793	.632	.705
	Within Groups	5398.218	164	32.916		
	Total	5522.977	170			
Exams	Between Groups	226.782	6	37.797	.858	.527
	Within Groups	7221.195	164	44.032		
	Total	7447.977	170			
Total (Coursework & Exams)	Between Groups	340.302	6	56.717	.560	.762
	Within Groups	16623.382	164	101.362		
	Total	16963.684	170			
Overall total (C/W, Exams, & SLOs)	Between Groups	945.214	6	157.536	1.486	.186
	Within Groups	17386.096	164	106.013		
	Total	18331.310	170			
SLOs	Between Groups	178.298	6	29.716	3.106	.007
	Within Groups	1569.012	164	9.567		
	Total	1747.310	170			

The findings displayed in Table 6 revealed non-significant difference in the students' coursework, exams, total (coursework and exams), overall total (coursework, exams, SLOs). However, the difference was significant for SLOs.

Research Question 6: To what extent will teaching strategies and learning styles predict the student's academic achievement?

Table 7

Multiple Regressions table showing teaching strategies and learning styles as predictors of academic achievement (N = 171)

Variables	SE(B)	β	t	Sig.(P)
Learning Styles	.016	.226	3.27	.001
Teaching Strategies	.012	.369	5.55	.000
RSq = .200; (20%) (F (2,168) = 21.04, p < .00)				

The result displayed in table 7 shows that overall, the teaching strategies contributed more ($\beta = 0.369$, $p < 0.05$) to the variance in academic achievement (SLOs) than the learning styles ($\beta = 0.226$, $p < 0.05$) and this result was significant ($F(2,168) = 21.04$, $p < .00$). This result indicates that both the teaching strategies and the learning styles are important in the attainment of student's academic achievement and learning outcomes.

Discussion

This study examined the learning preferences (visual, auditory, kinaesthetic), the teaching strategies (videos, games, role-play, discussion, group work, clarification pauses, five-minute-paper, discussion forum and glossary activity) and their influence on the academic achievement of some Psychology undergraduate students at the University of the West Indies. One of the research questions was to find out which learning styles exist among the learners. Interestingly, seven types of learning styles emerged from this study: visual, auditory, kinaesthetic, bimodal - visual and auditory, bimodal - visual and kinaesthetic, bimodal - auditory and kinaesthetic, and finally, the multimodal learners - visual, auditory and kinaesthetic. This finding though interesting and at the same time was expected because like other learners around the globe, the sample of this study also processed incoming information in multifarious ways and as Gregorc (1979) earlier suggested, they exhibited distinctive behaviors which serve as indicators of how they learn from and adapt to their environment. The results in Table 3 also revealed 51% visual, 21% auditory, and 14% kinaesthetic learning preferences in the sample of this study. This result contrasts with that of Fardon (2013) who found that 38% visual, 35% auditory and 73% kinaesthetic learners existed among his sample of military students. This discrepancy in the results of the two studies may be attributed to a number of factors. First, the nature or the requirements of learners' careers in the two studies are different; the sample of the present study are psychology students who are likely to process information via visual mode as they study human behaviours whereas the military sample in Fardon's study may prefer to do things and get involved in different activities which will make them learn effectively in their vocation. Secondly, the sample of this study consisted of more females than males ($m = 43$; $f = 128$); while Fardon's sample of 160 participants consisted of just 5.63% females. It is noteworthy here that gender is a determining factor in learning styles thus suggesting further studies of the influence that gender may have on students' learning styles.

Similarly in this study, just as the students revealed their preferences for learning styles, they also chose their learning strategies as displayed in table 4. A close look at the results revealed that the learners' choices of learning strategies were consistent to a greater extent with their learning modalities: visuals learn best with videos, auditory with discussion method while kinaesthetic deviated a little bit by preferring discussion strategy. These teaching strategies become learning strategies when students independently select the appropriate ones and use them effectively to accomplish tasks or meet goals (Alberta Learning, 2002). It is also interesting to find that in addition to the visual learners who prefer videos most, all the students with multiple learning preferences indicated their choices for videos along with other teaching strategies. This may not be surprising because videos were stimulating and motivating for this sample when utilized during the lectures and it was like bringing a guest lecturer into the classroom to avoid the monotony of listening to just one instructor throughout the semester as earlier reported by Poonati and Amadia, (2010). Thus, the answers to the first question posed initially is yes, it is possible to identify the most appropriate teaching strategies for each learning style.

Another major finding of this study was that generally, the students scored above average in the measure of academic performance irrespective of their learning styles (Table 5) however, the learners with multiple learning preferences scored the highest in all the components of academic achievement and overall while the visual, auditory and kinaesthetic learners' mean scores were very close for all the components of academic achievement indicating that no learning style is superior to another. A probable reason for this result may be due to the fact that the students' learning preferences were consistent with their choice of learning strategies as discussed earlier.

This corroborates the assertion that when the teachers' teaching styles are consistent with the students' learning styles, they will promote the learning and educational effectiveness (Liu, 2007). Additionally, these results were quite expected among this sample because the active learning strategies were well integrated into the learning activities, therefore learning was fun, interesting, captivating, motivating and inspiring for the students in this course (Fayombo, 2014). The answer to the second question posed earlier is also yes, because matching these two learning-related concepts can result in improved student academic achievement and learning outcomes.

The findings in table 6 revealed non-significant differences in the different aspects of academic achievement of the visual, auditory, kinaesthetic, bimodal and multimodal learners except in SLOs. This is not surprising because no learning style is superior to the other as earlier reported by Felder, (1996), Felder & Brent, (2005) and Fleming, (2001). This finding also corroborates Fardon's (2013) earlier report that matches between students' learning styles and instructional strategies did not affect the students' learning performance. However, one reason for the significant difference in SLOs (which assesses students' knowledge of the course content at the lecture most of the time) may be due to the fact that processing information, remembering and responding to questions immediately and later may vary among the different learners. This finding also lends credence to Al-Saud (2013) who reported that students with a single learning style preference students had a lower mean GPA when compared with those with multiple (quad-modal) learning style preferences.

The final result in Table 7 showed that both learning styles and learning strategies jointly contributed 20% ($Rsq=0.200$) to the variance in the academic achievement (SLOs) and this was found to be significant ($F(2,168) = 21.04, p < .01$). A probable reason for this finding could be attributed to the fact that in this study, the student learning styles match their active learning

strategies which were well packaged to enhance their academic achievement in this psychology course. This result amplified the earlier report that agreement between teaching strategies and learning styles has a positive impact on the academic achievement of the students (Damrongpanit & Reungtragul, 2013; Tulbure, 2012).

Conclusion

The findings of this study revealed among other things that students learn differently and they also prefer different teaching strategies. The onus is on the instructor to use different teaching strategies including videos, role play, games, discussion, group work and glossary activities as demonstrated in this study to cater for learners' diverse needs as well as improve the information assimilation and learning experiences. Thus, it is necessary for the instructors to discover their learners' distinctive behaviours at the beginning of the academic or training session so as to be able to utilise the teaching strategies that will match the varieties of their students' learning styles for good academic achievement. Additionally, seven types of learning preferences emerged from this study; the visual learning mode was predominant and video simulations as a teaching strategy was most preferred by the students indicating that more emphasis should be on visual mode of learning as well as the use of videos as a teaching strategy although no teaching strategy or learning style is superior to the other as indicated in the result of this study. On the whole, this study had demonstrated that the teaching strategies and learning styles are very important in academic achievement and that matching both learning and teaching styles is achievable and rewarding for the learners and the instructors. However, further studies can be carried out to find out whether gender and some other psycho-social variables such as age, matriculation status, course of study and family background or social economic status will affect students' learning preferences and their choice of teaching strategy which may impact academic achievement.

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