

Perceptual Learning style Preferences in Relation to Gender, Academic Achievement and Field of Study among a Sample of UAE College Students

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Abstract: The current study aimed to determine the preferred learning styles of Al Ain University of Science and Technology students and the differences in their learning styles according to gender, academic performance and field of study. The sample consisted of 210 students (91 males and 119 females). Reid's (1987) Perceptual Learning Style Preference Questionnaire (PLSPQ) was used to collect data. Results showed that the major learning style preferences of AU students include, Auditory, Visual and Group. Kinesthetic, Tactile and Individual as a minor learning styles and these students did not disfavour any style. Results further showed that there were significant differences in learning styles according to gender. Males were more auditory and tactile learners, whereas female students were more group learners. In addition, student learning style preferences did not vary by academic performance, but not for group learning style preference. With respect to the field of study, the education students were found to be more tactile learners than the students in the other fields of study, whereas the law students were more group learners and the pharmacy students were more individual preferences than the students of business, education, engineering and law students. The study suggested that understanding how university students learn would, hopefully, help improve the quality of instruction in higher education.

Keywords: UAE, Learning Style, college students, academic achievement, gender, fields of study

INTRODUCTION

College students, as any learners, have different strengths and preferences in the ways they collect, process, and organize information into useful knowledge, i.e., they have different learning styles [1]. Learning styles are considered by many to be one factor of success in higher education [2]. Many researchers have argued that knowledge of learning styles can be of use to both educators and students. It is indeed vital for teachers to have awareness of their learners' needs, capacities, potentials and learning styles preferences for effective classroom teaching and learning [3]

Moreover, awareness of learning styles of the learners will aid teachers, instructors, adult, educators, course designers, program and training developers to develop a curriculum and addresses individual learning needs. Alternatively, students with knowledge of their own preferences are empowered to use various techniques to enhance learning, which in turn may impact overall educational satisfaction.

The individuals should know what their own learning styles are and what characteristics this style has and they should thereby behave according to this style. In this way, the individual can acquire the constantly changing and increasing amount of information without need for the assistance of others [4].

McLachlan [5] stated that individual students are driven by different things and the students learning styles and learning drivers may vary from individual to individual. As researchers found difference in the way individual learner learn, a need to address individual learning styles and integrate activities to match teaching styles to the learning styles has become a necessity for educators. Hall and Moseley [6] expressed that course designers and instructors should be attentive to the learning styles of students by investigating their learning styles and encouraging them to think and reflect on their own learning styles.

Perceptual learning style definition

The different styles that people use to learn were termed as learning styles. Honey and Mumford [7] describe learning style as an individual preferred or habitual ways of processing and transforming knowledge. Keefe [8] emphasizes learning styles as cognitive, affective, and psychological traits that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment. Moreover, Dunn [9] hold that each individual's concentration on, mental processes, internalization and retain of new and difficult information stem from his specific learning style. Thus, learning styles are concerned with how students prefer to learn not what they learn.

According to Reid [10], the term learning styles describes an individual's natural, habitual and preferred way of absorbing, processing and retaining new information and skills. For the purpose of this study, Reid's definition of learning style and her classification of learning styles into six types, Visual, Auditory, Kinesthetic, Tactile, Group, and Individual, will be used as they are the most widely used and accepted definition and categorization of learning styles. As the name suggests, visual learning style refers to the learning by seeing. Auditory learning style refers to the learning through listening to someone. Tactile learners like to learn through hands-on experiences (building models and working with vocabulary puzzles). Kinesthetic learners prefer to learn by physical activity and movement. Individual learners prefer to study alone. Group learners like to work and study in group [11].

In her investigation of the perceptual learning styles of non-native English (NNS) students in the United States, Reid [12] developed the Perceptual Learning Style Preference Questionnaire (PLSPQ). The PLSPQ is a self-reporting instrument that was designed to measure these six perceptual learning styles; this instrument has been used extensively in many studies across different cultures. This questionnaire has been chosen for use in the present study to elicit the learning styles of the sample of students participating in this study.

A number of studies have examined factors that have an influence on students' learning styles. Among these factors, gender, academic performance and fields of study are claimed to be crucial and seem to have a great effect in learning process [13].

Learning styles and gender

A number of studies focusing on the relationship between gender and learning styles reveal that gender differences in learning style preferences partially exist among learners. Kolb & Kolb [14] accept that there can be some influence of gender in learning style preference. Males and females were found to have different learning styles. For example, Miller et al. [15] found that males were more kinesthetic, tactual, visual, and required more mobility than females, whereas females were more conforming and more self, parent, or teacher- motivated than males. Male students tended to be more visual [16], tactual, or kinesthetic, whereas female students tended to be more auditory [9].

Incongruent with the above studies, the relationship between gender differences and learning styles is not found in some research studies. Tuan [17] reported that there was no significant difference between Vietnamese male and female students in auditory learning styles. This means that the use of auditory learning style was equally preferred by both genders. Thus, the issue of gender differences in

learning style preferences is not inconclusive. Taken together, the inconsistent results of this line of research yield the generalisability of the results. These reasons call for more studies to assess for the role of gender differences in learning style preferences.

Learning style and students' achievement

Perceptual learning style has been reported to be one of the significant factors that may impact students' achievement on various academic subjects [18]. Griggs and Dunn [19] claim that students who learn from an approach compatible with their preferred learning style experience greater academic achievement and have a more positive attitude towards learning. Moreover, Dunn, Beaudry and Klavas [17] assert that through voluminous studies, it has been indicated that both low and average achievers earn higher scores on standardized achievement tests when they are taught within the realm of their learning styles.

Dunn and Dunn [20] believe that low achievers tend to have poor auditory memory. Although they often want to do well in school, their inability to remember information through lecture, discussion, or reading causes their low achievement especially in traditional classroom environment where teachers dominate and students mostly listen or read. It is not only the low achievers learn differently from the high achievers, they also vary among themselves.

According to Felder [1] students learn more when information is obtainable in a variety of approaches than when only a single approach is applied. Much experiential research indicates that learning styles can either hamper or increase academic performance in several aspects even though not much research has been conducted on the relationship between instructional design of learning materials and learning styles [22].

As such, studies carried out conclude that students retain 10% of what they read, 26% of what they hear, 30% of what they see, 50% of what they see and hear, 70% of what they say, and 90% of what they say as they do something [23].

These facts reveal that each learning style has its own strengths and weaknesses.

Some students learn in many ways, while others might only favour one or two. Those students with multiple learning styles tend to gain more and obtain higher scores compared to those who rely solely on one style [20].

Drysdale et al. [24]. carried out a study on the effect of learning style on the academic performance of 4,546 first-year students. Although they found academic performance based on learning style to be significant in 11 of the 19 courses, they found no significant differences between the learning style and academic performance of liberal arts and social sciences'

students. In another study, O'Brien [25], whose subjects represented a variety of majors including business, education, and arts and sciences, found that differences in learning styles were associated with academic achievement.

Learning styles according to fields of study

A further factor worth investigating is fields of study, which have been shown to play a significant role in the use of learning styles. Fazarro and Martin [26] suggested that learning style preferences of the students were likely to differ in the different chosen majors. That is, similar learning styles were likely to be found among the students who are in the same major. Alumran [27] research showed that the information technology students were found to be more Active Learners than the Science students and Law students measured by Index Learning Styles instrument. Some researchers compared the learning styles of American students across some academic colleges such as education, Liberal Arts and Business found that the most preferred learning style was the visual Learning Style [28].

Another researchers have found that certain university students, who study engineering, business management, sciences and human sciences have different learning styles in different cultures such as USA, England, Brazil and Pakistan [27]. In an earlier time, some researchers have detected that the most preferred learning style is visual learning style by comparing the learning styles of American Students in some academic colleges with Education, Science, History, Philosophy and Business Management[28].

Although research studies on learning styles and fields of study are common, reflecting a distinction in the use of learning styles between students from different fields of study, the relationship between learners' fields of study and learning styles are not explicit due to conflicting results generated by previous studies. Therefore, more studies are needed to verify the relationship between fields of study and learning styles.

Previous Research

Research has shown that the most preferred learning style in North American culture is the visual style [29]. Reid [12]) and Stebbins [30] found that among Hispanics, kinesthetic and tactile learning styles are the major preferences.

Arabic students show a strong preference for learning via auditory mode, which may be explained by Reid's (1987) that in Arab society, spoken language and oral eloquence is emphasized through poetry reading. Chinese and Vietnamese learners demonstrate a preference for visual learning, which could be partly explained by the pictorial nature of their written language. The Japanese, however, do not strongly identify with any style preferences (Stebbins, 1995).

Reid [12] performed a significant study on learning style preferences by using Perceptual Learning Style Preference Questionnaire (PLSPQ). She asked 1388 students to identify their perceptual learning style preferences. The results showed that ESL students strongly preferred kinesthetic and tactile learning styles. Most groups showed a negative preference for group learning. Graduated students indicated a significantly greater preference for visual and tactile learning than undergraduates. Both graduates and undergraduates strongly preferred to learn kinesthetically and tactilely.

Following Reid's study, Stebbins [30] carried out a study employing the (PLSPQ) among 660 students who were enrolled in eight university-affiliated intensive English programs and were coming from 63 countries. They were majoring in 92 fields of study, and had 43 language backgrounds. It was interesting that the results of Stebbins' study were in parallel with Reid's (1987) findings showed that students participating in this study strongly preferred kinesthetic and tactile learning styles.

Mulalic, et. al. [31] explored the perceptual learning styles of students in Malaysia. The findings showed that the dominant learning style was kinesthetic. Also There was significant difference in learning styles between male and female students regarding auditory and kinesthetic learning styles. Male students favored kinesthetic and auditory learning when compared with the females.

In Iran, Riazi and Mansoorian [32] investigated in their study the preferred learning styles of Iranian students who were studying English at EFL institutes in different cities in Iran. An overall of 300 participants were selected from 6 different cities. The data on learning styles were collected by (PLSPQ, 1987). The findings indicated that the auditory learning style, the visual learning style, the tactile learning style, and the kinesthetic were preferred by the students as the major styles. Both female and male students chose the individual learning style and the group learning style as one of their minor learning styles. The study also revealed that males were more interested in tactile, group, and kinesthetic learning styles while the female students showed less preference toward these learning styles.

In his study Ahmad [33] examined the learning style preferences of 252 students at a local tertiary institution in Malaysia. Results indicated that all six styles were negative learning styles and that gender did not seem to influence students' learning style preferences.

Obralić and Akbarov [34] conducted a study to determine the learning styles of students at International University of Sarajevo. The sample comprised 34 learners. They used Reid's PLSP questionnaire to

collect data. The results showed that students performed well in the individual style as they did in the kinesthetic followed by the auditory and the group style. The study indicates that there was no significant difference between male and female students regarding their preferred perceptual learning style.

Using the PLSPQ to identify Thai learners' English learning style preferences, Khmakhien [13] conducted a study on 262 Thai university students. The results indicated that Thai learners preferred auditory learning most, followed by kinesthetic, group, tactile, visual and individual learning, respectively. Among these three variables, field of study is the most significant factor affecting the choice of learning styles. However, no statistically significant difference was found between the mean scores of male and female students in all of the six learning styles. Khasawneh, Abu-Tineh and Obeidat [35] performed a study to find the relationship between learning style preferences and academic achievement of the Hashemite University students. The findings revealed that the differences in learning styles were not found due to gender, educational level, and specialty area.

In a more recent study, Gappi [36] explored the Bahraini college students' learning style preferences. The participants consisted of all the freshman students. Results showed that there was no significant effect of gender, age, academic performance and academic program on the learning style preferences of the students. Aqel and Mahmoud [37] performed a research to identify the learning styles used by An-Najah National University students. The data were collected from a sample of 120 male and female students. It was found that there were no statistically significant differences in the learning styles which might be attributed to gender.

In Bahrain, Alumran [27] performed a study aimed to investigate the preferred learning styles of Bahraini university students and the differences in their learning styles according to Gender and Field of Study. The sample consisted of 877 students. Results showed that the total sample preferred the Visual LS. Results further showed that there were significant differences in learning styles according to gender and different fields of study.

In Jordan, Aljaafreh [38] performed a study to look into the effect of Discipline, GPA and Gender on students' learning styles. 613 male and female students from Jordanian university participated in the study. The results revealed that the students' discipline and their GPAs exerted important effects on their use of three of the ILP processes (Deep Processing, Elaborative Processing, and Methodical Study): There were significant differences between the students according to their majors, and the students with higher GPAs were superior to those with lower GPAs in using these

processes. The findings of the study suggest that there is a strong relation between learning styles and academic achievement.

Study Objectives

Given the importance of knowing learning styles, this study aims to identify AU students' perceptual learning styles using Reid's Perceptual Learning-Style Preferences Questionnaire. This study also aims to determine the impact of three factors, namely, gender, academic performance and fields of study on students' perceptual learning style preferences.

Research questions

This study sought answers to the following questions:

- 1: What are the perceptual learning style preferences of the Al Ain University of Science and Technology students?
- 2: Do perceptual learning style preferences of the Al Ain University of Science and Technology students vary based on differences in gender?
- 3: What is the relationship between learning styles of the Al Ain University of Science and Technology students and their academic achievement as measured by GPA?
- 4: Do perceptual learning style preferences of the Al Ain University of Science and Technology students vary based on differences in the field of the study?

Significance of the study

It is observed from the literature on learning styles that knowing students learning styles can be useful for both teachers and students and make the learning process more Fruitful (Reid, 1995). The results of this study may help instructors in understanding the various learning styles favored by their students

The result of this study may help curriculum developers and material producers in AU to integrate the appropriate activities, aids, drills.....etc that match the preferred styles by AU students. The result of this study will also help fill in the gap in the literature related to the lack of research in higher education and the contradictory results regarding the relationship between learning styles and different factors such as gender, academic achievement and field of study.

RESEARCH METHOD

Participants

The sample of this study consisted of 210 UAE college students. The sample had 91 (43.3%) males, 119 (56.7%) females. The age of the sample ranged from 18 to 32, with a mean of 21.3 (SD = 2.09). The students who participated in this study were randomly selected from all the academic colleges at Al Ain University of Science and Technology (AU). Of the total number of

participants 32.8% (N= 69) were high achiever, 51.0% (N= 107) moderate achievers, and 16.2% (N= 34) low achiever students. The distribution of the sample amongst the different academic colleges was as follow: College of Business (n= 37, 17.5%), College of

Education (n= 323, 11.0%), College of IT (n= 23, 11.0%), College of Pharmacy (n= 44, 21.0%), College of Law (n= 83, 39.5%). Table 1 shows the characteristics of the sample.

Table 1: The Characteristics of the Subjects in the Study

		f	%
Gender	Male	91	43.3
	Female	119	56.7
	Total	210	100
Achievement	High	69	32.8
	Moderate	107	51.0
	Low	34	16.2
	Total	210	100
Field of study	Business	37	17.5
	Education	23	11.0
	Engineering	23	11.0
	Pharmacy	44	21.0
	Law	83	39.5
	Total	210	100

Measures

Reid's (1987) Perceptual Learning Style Preference Questionnaire (PLSPQ) instrument was used in this study to identify and measure the learners' perceptual learning style preferences in six perceptual learning styles (auditory, visual, tactile, kinesthetic, individual and group). The PLSPQ consists of 30 items designed to elicit the six perceptual learning styles preferences and it also seeks to identify students' major (the most preferred way of learning), minor (the second most preferred way of learning), and negative (the least preferred way of learning) learning styles. Subjects are expected to indicate how much they agree with each item on a scale from 1 to 5 when they learn. Each number notes certain measurement such as: (5) strongly agree, (4) Agree, (3) undecided, (2) disagree, and (1) strongly disagree.

According to the PLSPQ description, visual learners are most comfortable with pictures, images and graphs while studying and retaining information. Example of question for this type of learner would be "I learn better by reading than by listening to someone". Auditory learners learn best when hearing the information and, perhaps, listening to the lecture. Thus, the learner needs to express verbally when he/she learns. Example question for this type of learners would be "I learn better in the class when I listen to someone".

Kinesthetic learners prefer active participation experience, for example drama, role-play or moving around. Such students learn best by experience and by being involved physically in classroom experiences. Example question for this type of learners would be "I prefer to learn by doing something in class. Tactile learners prefer hands-on work, for example, handling materials or taking notes. Working on an experiment in the laboratory is the best way for such students to learn

new materia. Example question for this type of learners would be " I learn more when I make something for a class project.

Group learners prefer studying with others. Group studying make them feel comfortable and it is best way for them to acquire knowledge. Students also value class interaction and class work with other students, and they remember information when they work with two or three classmates. Example question for this type of learners would be " In class, I learn best when I study with others". Individual learners prefer studying alone and they learn best independently. Such students learn new material best when reading it themselves. Progress and achievement is best visible when they learn alone. Example question for this type of learners would be " In class, I work better when I work alone.

When the numerical value was assigned to the corresponding learning style, the numbers were added to obtain a total score and then it was multiplied by 2 determining the major, minor or negligible learning style. After that, all the results were analyzed by categorizing them into according to the aforementioned learning style preferences and presented in the findings.

In terms of the reliability of the instrument, a study by Tabanlıoğlu (2003) reported a Cronbach Alpha of .82 for the questionnaire. In the current study, the reliability estimates for the scores of the PLSPQ subscales were .721, .709, .724, .745, .802 and .746 for the visual, auditory, tactile, kinesthetic, group, and individual, respectively, which are considered adequate given that the PLSPQ is not used for high-stakes decision. For the whole questionnaire, the Cronbach Alpha was .783 and the three-week test-retest reliability coefficient was .79.

For the purpose of this study, by using the “forward-backward” procedure, the English version of the (PLSPQ) used in this study was first translated into the Arabic language by an expert in bilingual language, then another bilingual expert translated the Arabic version into English without accessing to the original version. A third bilingual faculty member compared the translated English versions. Any discrepancies between the original English version and the back-translated version were discussed carefully by the translators and then resolved by joint agreement.

The ranges of GPAs were categorized into three categories representing high, moderate, and low grade point averages. Low GPAs, 16.2% of the sample, included students with below 2.0 GPA on the four-point university scale. Moderate GPAs, 51% of the sample included students with 2.0 to less than 3.0 and high GPAs consisted of 32.8% of the sample and included students with 3.0 GPA and above. In addition, a questionnaire was designed to collect general demographic information including gender, age, GPA, and student’s college.

Procedure

The study was a descriptive research carried out on the students of Al Ain University of Science and Technology during the second semester of the 2012-2013 academic year. Permission for participation of students was obtained from the related chief departments. Before administering the questionnaire, a brief instruction was given to the participants telling them about the purpose of the self-reporting questionnaire and asking them to respond to each statement quickly. The students were asked to fill a background questionnaire and the PLSPQ. The background questionnaire contained information related to age, gender, GPA and college. It took about 15

minutes for the students to answer the questionnaire items and then the sheets were collected.

The modified version of the questionnaire was piloted on a random sample of twenty five students (11 male and 14 female) and made more reliable by refining some of the questions in relationship to its users’ demographic background and language proficiency. All participants were treated in accordance with the Ethical Principles of Psychologists and Code of Conduct (APA, 1992).

Data analysis

Descriptive statistics were used to generate means, standard deviations, and frequencies for the study variables. A statistical analysis was performed using the Statistical Packages for Social Sciences (SPSS) version 17.0 software (SPSS Inc., Chicago, IL) . T test analysis was performed to determine if there were significant differences between male and female students in their learning styles. A series of one way analysis of variance (ANOVA) was run to explore if there was a relationship between learning style and both of academic performance and fields of study.

Before performing the ANOVA, the homogeneity of variance was verified using Levene’s test (Coakes & Steed, 2003). Effect sizes were calculated and the impact of different learning styles on academic achievement was investigated.

RESULTS

The first research question addressed that according to the preferred learning styles dimensions of AU students’ results showed that, of the participants in this study, 59(28.1%) preferred the auditory learning style, 47 (22.4%) preferred the visual learning style, 33(15.7%) preferred tactile learning style, 31(14.8%) preferred kinesthetic learning style, 37 (17.6%) preferred group learning style, and only 15 (7.1%) preferred the individual learning style.

Table 2: Descriptive statistics and Cronbach’s alpha values Concerning Perceptual Learning Style (n = 210).

Learning style	Mean	Std. Deviation	Frequency	Percentage	Rank	Cronbach’s alpha “α”
Visual	39.19	8.52	47	22.4	2	.721
Auditory	39.67	7.27	59	28.1	1	.709
Tactile	37.38	9.40	33	15.7	4	.724
Kinesthetic	35.90	8.65	31	14.8	5	.745
Group	38.05	8.71	37	17.6	3	.802
Individual	35.28	8.911	15	7.1	6	.746
Total	210		210	100.0		

The findings of this study revealed that the major learning style preferences of AU students include, Auditory, Visual and Group. Kinesthetic, Tactile and Individual as minor learning styles and these students did not disfavour any style.

As can be seen from Table 2, the auditory learning style was chosen as a major learning style among the participants (total mean = 39.67). This shows that students prefer to learn by listening. Visual learning style was preferred as a major style by the students (total mean = 39.19). These students usually enjoy

reading and prefer to see the words that they are learning. They also like to learn by looking at pictures and flashcards. Group learning style was chosen as a major learning style (total mean = 38.05). This means that these students acquire knowledge best when they study with one or more students in a group.

Table 2 reveals that the mean scores of the tactile, kinesthetic, and individual learning styles are 37.38, 35.94, and 35.28 respectively. This means that these learning styles are considered minor learning style preferences. Students who prefer the tactile learning style have to be physically involved in class activities. Kinesthetic students prefer hands-experience to create and develop what they learn. Individual learning style preference students learn best when alone in a quiet environment to study or work on a project.

The data in Table 3 shows that, of the 210 participants, 123 (58.6%) selected visual learning style as their major learning style preference, 58 students (27.6%) as a minor, and 29 (13.8%) as negligible. The same table reveals that 129 students (61.9%) chose the auditory learning style as their major, 47 (22.4%) as a minor, and 34 (15.7%) as a negligible. For the tactile style, 127 students (60.5%) chose this preference as a major, 55 (26.2%) as a minor and 28 (13.3%) as a negligible learning style preference. Within the same sample, 117 students (55.7%) listed kinesthetic as their major learning style preference, 64 (30.5%) as a minor, and 29 (13.8%) as a negligible preference. Table 3 indicates that 131 students (62.4%) preferred group preference as a major, 57 (27.1%) as a minor, and 22 (10.5%) as a negligible preference. The individual preference was indicated as a major preference by 86 (41.0%) students, a minor by 89 (42.3%) students, and a negligible by 35 (16.7%) of the students.

Table 2: Distribution of the whole sample according to the perceptual learning preference

LS	Visual		Auditory		Tactile		Kinesthetic		Group		Individual	
	F	%	F	%	F	%	F	%	F	%	F	%
Major	123	58.6	129	61.9	127	60.5	117	55.7	131	62.4	86	41
Minor	58	27.6	47	22.4	55	26.2	64	30.5	57	27.1	89	42.3
Negligible	29	13.8	34	15.7	28	13.3	29	13.8	22	10.5	35	16.7
Total	210	100	210	100	210	100	210	100	210	100	210	100

Note. Major learning style = scores 38-50; Minor learning style = scores 25-37; Negligible learning style = scores 24 or less.

To answer the second research question regarding the difference between learning styles of the students according to their gender, independent t-test was applied to the data. As noted in Table 4, t-test analysis revealed that there was a significant difference between male and female students regarding auditory learning style ($t = 2.385, p \leq .01$), tactile learning style ($t = 3.952, p \leq .001$), and group learning style ($t = -3.453, p \leq .01$). The mean score for male students was higher, 39.91, and 40.13 respectively in both auditory

and tactile learning styles than female students ($M=36.54$, and 35.28 , respectively). The female student, on the other hand, obtained higher mean for group learning style ($M= 39.38$) compared to the male students ($M=35.27$). This means that male students favored auditory and tactile learning styles more than their counterparts. On the other hand, female students favored group learning style more than male students. The result indicated that female and male students perceived different learning style.

Table 4: Independent Samples T-test for Gender Differences in Perceptual Learning Styles (n= 210).

LS	Gender				T-test result		
	Male (n=91)		Female (n=119)		Std. Error Mean	t-value	P-value
M	SD	M	SD				
Visual	39.10	6.60	36.54	39.26	1.016	-.159	.871
Auditory	39.91	9.31	36.54	9.95	1.172	2.488	.018*
tactile	40.13	7.8	35.28	9.81	1.269	3.825	.000**
kinesthetic	35.36	8.73	36.39	8.68	1.203	-.844	.400
Group	35.27	9.16	39.38	7.63	1.175	-3.453	.001**
Individual	34.97	8.72	35.51	9.08	1.242	-.426	.660

Notes: * $p < .01$, ** $p < .001$

To answer the third question, (Do students learning style differ according to their academic performance), one-way analysis of variance (ANOVA)

was conducted to investigate the existing possible differences among perceptual learning style preferences and the three academic achievement groups. The results

of the analysis are displayed in Table 5 where the data show the difference is not significant for visual preference (F=1.588, p<0.05), auditory (F=.107, p<0.05), tactile preference (F=2.318, p<0.05),

Kinesthetic (F=2.371, p<0.05), and individual preference (F=.159, p<0.05). However, there is a statistically significant difference in group preference (F= 3.806, p≥ 0.01).

Table 5: ANOVA results for the learning styles and academic achievement (n = 210)

Learning style	Academic Achievement						ANOVA result	
	High (n= 69)		Moderate (n= 107)		Low (n= 34)		F-value	Sig.
	M	SD	M	SD	M	SD		
Visual	36.14	11.60	38.710	10.20	39.35	9.273	1.588	.207
Auditory	40.03	8.530	39.42	8.940	39.71	7.238	.107	.899
tactile	36.26	9.664	37.14	9.616	40.41	7.656	2.318	.101
kinesthetic	37.22	7.838	35.87	9.146	33.29	8.281	2.371	.096
Group	39.04	9.271	38.58	8.387	34.35	7.792	3.806	.024*
Individual	34.81	8.666	35.59	9.176	35.24	8.767	.159	.853

Notes: *p < .01, **p < .001

As for group learning style, the results of ANOVA show that the difference at least between two achievement groups is significant (F= 3.806 at p<0.05). Further analysis using the Tukey HSD multiple comparison test showed there was a significant mean score difference between high and low achievers

(1.7858), and between low and moderate achievers (1.618) on group learning style unlike the difference between moderate and high achievers (1.364) which indicate no significant difference in the mean score (See Table 5).

Table 6: Tukey HSD Comparison Test on group learning style mean for high, moderate and low achievement groups (N= 210).

Group learning style	Mean	Mean Difference		
		High	Moderate	Low
High	39.04	-	1.328	1.802*
Moderate	38.58	1.328	-	1.693*
Low	34.35	1.802*	1.693*	-

Note: * The mean difference is significant at p<0.05 level

In order to answer the fourth question, means, standard deviations of students learning styles according to fields of business, education, information technology, and law were calculated and reported in Table 6. One-way ANOVA test has been used. As it can

be seen in table 7, the field of the study effect was attributed to tactile learning style F= 3.506, p <.05, group learning style F= 3.220, p <.05, and individual learning style F= 2.787, p <.05.

Table 7: ANOVA results for the learning styles and field of study (n = 210)

L S	Field of study	n	M	SD	df	F	p
Tactile	Business	37	37.14	9.256	4	3.506	.009*
	Education	23	40.17	7.884	205		
	Engineer	23	35.13	8.131	209		
	Pharmacy	44	33.73	10.267			
	Law	83	39.28	9.152			
Group	Business	37	36.49	9.791	4	3.220	.014*
	Education	23	38.35	8.690	205		
	Engineer	23	32.87	8.374	209		
	Pharmacy	44	39.23	7.310			
	Law	83	39.47	8.537			
Individual	Business	37	35.41	8.108	4	2.787	.028*
	Education	23	37.91	8.811	205		
	Engineer	23	35.48	7.728	209		
	Pharmacy	44	37.82	8.549			
	Law	83	33.06	9.346			

* p<0.05

In order to determine which field of study mean differences were significantly different from one another on measures of learning styles, Tukey HSD test for post-hoc comparisons ($\alpha < .05$) was performed for the tactile, group, and individual learning styles (see Table 8).

The results showed that the significant mean differences in tactile learning style were between students in pharmacy college and students in the college of law (M-difference (I-J) = 5.55). This result means that students in the college of law are more tactile than student in Pharmacy College. In group learning style, the mean differences were between students in the

college of law and IT college students (M-difference (I-J) = -6.60), and between students in the college of IT and pharmacy college students (M-differ. = 6.358).

This result indicates that the law students and the pharmacy college students prefer to use group learning style more than the It college students. The results further show that the mean difference in individual learning style was significant between students in the college of law and those in pharmacy college (M-difference (I-J) = 4.758). This result shows that students of pharmacy college prefer to use individual learning style more than students of the college of law.

Table 8: Tukey HSD Comparison Test for fields of study on students' learning style preferences (N=210).

LS	Field of study	Mean	Mean Difference				
			Business	Education	IT	Pharmacy	Law
Tactile	Business	37.14					
	Education	40.17					
	Engineer	35.13					
	Pharmacy	33.73					1.713
	Law	39.28				1.713	
Group	Business	36.49	-3.617	2.266	.502		
	Education	38.35	-5.478	2.516	.193		
	Engineer	32.87	-6.358*	2.196	.034		
	Pharmacy	39.23	-6.600*	2.011	.011		
	Law	39.47					
Individual	Business	35.41	-				1.730
	Education	37.91					2.062
	Engineer	35.48					
	Pharmacy	37.82					1.632
	Law	33.06			2.062		

Note: * The mean difference is significant at $p < 0.05$ level

This result consistent with the one reported by Reid [12] and dissimilar to that of Isemonger and Sheppard [40], which revealed no difference in students' learning style preferences due to the field of study.

DISCUSSION

The present study investigated the preferred learning styles of UAE college students. The study also examined the differences among these learning styles according to gender, academic achievement and field of Study. With respect to the first research question regarding the most preferred learning style among AU students', the findings revealed that the most frequent learning style for UAE college students was auditory style. Visual and group ranked the second and third styles. Also it was shown that individual style with the average 35.28 was the least frequent. These results concurred with most of the previous studies that indicated that the visual learning style dominated the other learning styles in some field of studies, such as in engineering students [28] and that students, in general, had different learning styles ([39, 28].

In fact, when comparing the result of this study to other studies from different cultural backgrounds that used the same instrument, the results showed some similarities, as well as some differences. Among these studies, and of particular relevance to this study, is the study conducted by Reid [12]. Her study showed that Arab learners preferred the kinesthetic modality to all other modalities, and they also showed a strong preference for the auditory modality. The present study partly confirmed that preference pattern. In her research, the Korean students were found to be the most visual in their learning style preferences. Japanese learners on the other hand, appeared to be the least auditory of all learners and were less auditory than Arabic and Chinese learners. These findings of the current study match the ones obtained by many researchers such as Willing [40], who stresses that Arab students with strong Islamic background in colleges in Australia preferred visual and auditory learning styles and Akkason [41] whose results indicated that learners favored Group learning most, followed by

Auditory, Visual, Kinesthetic, Tactile and Individual styles respectively.

In Arab societies, this results support – partially- the findings of Abu-Asba et al. [42]. They carried out a study on Yemeni students in Sana'a University. Findings show that the tactile and kinesthetic styles were the most prevalent styles among the students, followed by the auditory style.

Reid [12] found that Arab learners disliked individual learning styles and favored group learning more, similar to what the participants in this study revealed. This is due to the fact that these students are UAE students whose Arabic culture greatly influenced their lives and attitudes. Hofstede [43] stated that the Arabic society is a collectivist society. In a society, such as that in UAE, in which group cohesiveness is thought to be essential, students are supposed to de-emphasize self and to be concerned about the group. For this reason, they preferred to work in groups and did not prefer the individual learning style.

In terms of gender, females found it easy to learn in groups when compared to their male counterparts. This is in line with Isemonger and Sheppard's [44] observation of females' stronger preference for group learning. It seems that women tend to build relationships and use social networks with greater consistency than men. Or as Dybvig [45] reported that females usually outdo males in terms of group learning; they favor group work due to their stronger tendencies for social interaction.

The finding of this study regarding gender is dissimilar to studies that found no gender-related differences in this regard [e.g., 45; 12]. Interestingly enough, it is also in stark contrast with the finding reported by Riazi and Mansoorian [32] that Iranian females were less interested in group learning in comparison to their male counterparts. Mulalic, et al. [31] noted that researchers have warned that the preferences toward particular learning style cannot always be generalized, but that many factors influence students' preferences towards particular learning style, such as educational background, ethnicity, gender and motivation to learn. This result supports Chamot and Kupper's [46] findings as well as Osanai's [47] findings that students in some majors would use types of learning styles than students in other majors.

Concerning fields of study, as revealed, students in education fields were found to be more tactile learners than the students in the other fields of study, whereas the law students were more group learners and the pharmacy students were more individual preferences than the students of business, education, engineering and law students. This result consistent with the one reported by Reid [12] and Liu, Hu and Gan [48] who reported that minority students

from different academic backgrounds have various learning styles. Whereas this result dissimilar to that of Isemonger and Sheppard [44], which revealed no difference. This finding may be associated with the greater skills of students in technical fields (e.g., engineering and pharmacy) in activities such as model building, collage making, and working in laboratories as an essential part of their academic career. This result could be reflected in Joy and Kolb's [49] finding that the area of specialization seems to have a slightly larger effect on determining a person's liking for abstraction or concreteness than culture does.

Limitations of the study

The findings of this study allow for a clear understanding of students' learning style preferences for this sample of students. However, there are a number of limitations which temper the results. First, although the participants of this study were students from one university, this restricts the extent to which these findings might be applied to students from other colleges across the UAE. Second, the data in the current study were gathered at one point in time. Consequently, the respondents' perception may have been influenced by covariate factors. Thus, the interpretation of the results is constrained by the cross-sectional nature of the data. In addition, the current study was limited to self-report data, which may raise the potential problems with desirability bias and tiredness, thereby affecting the result of the study. Finally, difficulties such as misunderstanding the Likert-type scale and carelessness were encountered in the administration of the instruments. These difficulties may have affected the scores obtained and thus weakened the validity of the study.

Based on the limitations, the findings should be interpreted cautiously and the findings need to be replicated with more representative sample of college students. In general, future investigation should further investigate the learning preferences of UAE college students in other institutions to see whether a generalization on college students' learning style preferences can be made. In addition, the relationship between learning style and learning strategies could also be an area of investigation as both are important in helping students take control of their own learning.

CONCLUSION

The AU students sampled in this study responded to Reid's (1987) PLSPQ. The questionnaire was translated and piloted before the study proper. The participants preferred Auditory, visual and group learning styles and disfavored individual learning style. Gender, age, and field of study seemed to exert an influence on learning styles. Perceptual learning styles and their correlates, thus, emerged in this study as important elements to consider when constructing strategies of learning. The fact that students from different disciplines tended to function well within

differential learning styles could greatly help material producers develop suitable learning materials. In the same vein, teachers should help students stretch beyond their comfort zone of preferred learning styles [50].

This study aimed to investigate the students' preferred learning styles of AU students. The findings revealed that the students favoured visual, auditory and group learning styles. The tactile and kinesthetic styles were the next preferred style while the least preferred was the individual learning style. Generally, the perceptual learning styles of the AU students are classified into major and minor preferences. The major learning style preferences are visual, auditory and group. On the other hand, tactile, kinesthetic, and individual learning styles are considered to be minor preferences.

Moreover, the comparison between the learning style preferences of male and female students is consistent with the literature. In fact, both the current study and many of previous studies suggest difference between the learning style preferences of male and female students.

Implications for Teaching

The results of this study can provide useful information for improving the quality of the teaching and learning experiences of college students. The main implication for teaching is that multiple approaches should be adopted in order to accommodate the different learning styles. Instructors should be aware that there are diverse learning styles in the student population and should try out different procedures and techniques in the classrooms. Matching the instructors learning styles and strategies with students' varied learning style will surely increase the students' academic performance. Knowing the learning style can also be very supportive in the individualized instruction.

Recent research on teacher effectiveness has shown that successful teachers tend to be those who are able to use a range of teaching strategies and who use a range of interaction styles, rather than a single, rigid approach to teaching and learning (Darling-Hammond [51]).

Moreover, it is important to enable students to be self-aware of their learning styles in order to plan and make better use of their study time and learning strategies which can improve the academic performance and lead academic success. According to Stebbine [30], students who know their learning style preferences are able to build their self-confidence that can reinforce their willingness to be risk-takers. Students are also advised to try to adjust to different learning circumstances in order to avoid any confrontations when exposed to learning styles that do not suit them.

The results of the current study have shown that differences do exist in learning styles among the students from different gender and such differences should be taken into account when teaching college students. The fact that students from different disciplines tended to function well within differential learning styles could greatly help material producers develop suitable learning materials.

The counselors and educational advisors of the higher education institutions should educate students of their learning styles and the weaknesses and strengths associated with their style.

Implications for Further Research

Future investigations should investigate the learning preferences of UAE college students in other institutions to see whether a generalization on college students' learning style preferences can be made. In addition, the relationship between learning style and learning strategies could also be an area of investigation as both are important in helping students take control of their own learning.

Other factors which may contribute to UAE college students' learning styles such as students' age, major, and cultural backgrounds, also need to be studied across-cultural study that compares the UAE college students' learning style preferences to those of learners from other cultural backgrounds would be beneficial in examining how cultural identity shapes the way that students perceive their learning. A mixed method research design of both quantitative and qualitative research should be used to gain deeper understanding of individual, institutional, and environmental factors that may influence students' orientation toward a particular learning style.

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