

Learning Styles in Relation to Gender, Field of Study, and Academic Achievement for Bahraini University Students

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ABSTRACT - The 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 study further attempted to examine the contribution of learning styles as predictors of the academic achievement of students measured by their Grade Point Average (GPA). The sample consisted of 877 students (17-30 years). Results showed that the total sample preferred the Visual LS and the following learning styles: Active over Reflective; Sensing over Intuitive; Visual over Verbal, and Sequential over global. Results further showed that there were significant differences in learning styles according to gender and different fields of study. Males were more Intuitive learners, whereas females were more Sensing learners. With respect to the field of study, the information technology students were found to be more Active learners than the law students and science students; whereas the education students were more Active learners than the science students. The results further showed that the learning styles that were good predictors of student GPA were Visual/Verbal and Sequential/Global. The study suggested that understanding how university students learn would, hopefully, help improve the quality of instruction in higher education.

Successful universities are distinguished by the ability of their faculties to advance learning through understanding how their students learn. This understanding, if coupled with the appropriate pedagogical techniques would, hopefully, benefit student outcomes (Sims & Sims, 1995). Students have different strengths and preferences in the ways they collect, process, and organize information into useful knowledge, i.e., they have different learning styles (Dunn & Dunn, 1974; Felder, 1996; Felder & Spurlin, 2005; Kolb, 1984).

Males and females were found to use different learning styles (Boverie, Huffman, Meier, & Philbin, 1995; Keri, 2002; Miller, Finley, & McKinley, 1990). Students in different fields of study were also found to have different learning styles. Such differences were discovered, for example, between students with humanities-based majors and those with mathematically-based majors (Mathews, 1994); between students majoring in psychology and special education and those majoring in social work and criminal justice (Gadzella & Masten, 1998); and between psychology majors and biology majors (Clump & Skogsberg, 2003).

Though there has been recently a controversy regarding the impact of matching teaching instruction to student learning styles on students academic achievement (Cook, Gelula, Dupras, & Schwartz, 2007; Kavale & LeFever, 2007; Klien, McCall, Austin, &

Piterman, 2007), a significant body of the previous research in this area has suggested that increased learning gains can be achieved when instruction is tailored to the learning styles of students (Albaili, 1997; Baloglu, Gadzella, & Stephens, 2002; Dunn, Griggs, Olson, Gormman, & Beasley, 1995; Neslon et al., 1993; Williams, 1994). Such gains were evidenced in the academic achievement of male and female students who came from diverse fields of study, such as: business (DeVita, 2001); law (Dolle, 2000); humanities (Lopez, 2002); education, liberal arts, and engineering (Litzinger, Ha-Lee, Wise & Felder, 2005).

Unfortunately, the topic of learning styles receives little attention by educators in higher education and there seems to be a misconception regarding how students learn. This view is supported by Sim and Sim (1999) who stated that there appears to be a kind of "fatalism" regarding learning; one either learns or one does not. These authors further postulated that the inability to consciously manage the learning process in higher education lies in a lack of understanding the learning process itself, i.e. the student learning styles, which can hinder both learning and teaching.

Hence, the aim of this study was to shed light on the learning styles of university students, particularly that this topic has often been overlooked or garnered little attention in higher education institutions in Arabic universities. More specifically, the present 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 study further attempted to examine the contribution of learning styles as predictors of the academic achievement of Bahraini university students, measured by their Grade Point Average (GPA).

Models of Learning Styles

In the past few decades, several models have been developed to explore how students can learn: the Myers-Briggs Type Indicator Model (MBIT) by Mayer and Mayer (1987) classifies learners into: extraverts versus introverts, sensors versus intuitors, thinkers versus feelers, and judgers versus perceivers; Kolb's Model (1984), which classifies learners into four different types: convergent versus divergent and assimilational versus accommodational; Dunn and Dunn's model (1974) that takes into account multiple interacting elements, including environmental, sociological, emotional, and physical variables, each with its own sub-factors; and finally, the Felder -Silverman Learning Style Model (1988), which categorizes learners on a continuum into four dimensions: sensing/intuitive, visual/verbal, active/reflective, and sequential/global. These models belong to different conceptual frameworks: the first model is a personality model, the second one is experiential, the third one is multidimensional, and the fourth one is eclectic that has parallels in other models. Although different, these models overlap and were found to be correlated (Dunn & Griggs, 1995; Felder & Spurlin, 2005).

This study has adopted the Felder and Silverman model because it is comprehensive and has benefitted from the other models (Felder & Silverman, 1988; Felder & Spurlin, 2005). For example, this model combines some of the dimensions based on Jung's theory based on psychological types(Sensing/Intuitive) present in Myers-Briggs model, with Kolb's information processing dimension (Active/Reflective); and it avoids the complexity of Dunn and Dunn model (Zywno & Waalen, 2002). Moreover, the author of

this study believes that Felder and Silverman model is more suited to college level students as it has specifically been designed to be used with university students in academic colleges, very similar to the academic setting used in this study, but in Western cultures. The author, therefore, attempted to test the Felder and Silverman model in a different culture, such as the Arabic Bahraini culture. Furthermore, the Index of Learning styles (ILS), the instrument that was developed by Felderman and Solomon in 1997 to assess the learning styles included in the model is believed to be short, inexpensive, accessible, and a suitable instrument to be implemented with a large sample like the one that has been used in this study.

Learning Styles According to Gender

Males and females were found to have different learning styles. For example, Miller et al. (1990) 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.

Females also demonstrated stronger preferences than males for the Social/Conceptual learning styles showed a "Concern for Others" response, and learned best through hands-on experience and in practical settings, emphasizing the realm of the affective and doing. Males, on the other hand, showed a "Concern for Self" response, chose the Assimilator learning style (Abstract and Reflective) more than females, and seemed to learn best if they were thinking and watching and stressed more abstract/sequential learning styles (Keri, 2002; Philbin, Meier, Huffman, & Boverie, 1995).

These results should be taken with caution as gender ideology is disseminated through the representation of gender stereotypes in the mass media, through patriarchal structures of family, and religion, and through continued structuring of the workplace around gender inequality.

Learning Styles in Colleges of Different Fields of Study

Some researchers found that students of certain colleges, such as engineering, business, sciences, and humanities in different cultures, such as American, British, and Brazilian had different learning styles (Constant, 1997; De Vita, 2001; Lopez, 2002; 1999; Zywno, 2003). More recently, 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 (Litzinger, Ha Lee, Wise, & Felder, 2005).

Previous research in this area seems to be a kind of a mismatch between learning and traditional teaching styles in some fields of study. For example, Felder and Silverman (1988) postulated that the conventional lecture-based teaching instruction in engineering favored intuitive, verbal, reflective, and sequential students and that there was a mismatch between traditional engineering instruction and the learning styles of engineering students. These authors found that though 63 percent of undergraduate engineering students were sensors, the traditional engineering instruction tended to be oriented towards intuitors, emphasizing theories over practical applications.

They also found that although 83 percent of the undergraduates were visual learners, the engineering instruction was predominantly verbal, focusing on written explanations

over visual illustrations. These authors finally found that 64 percent of students were active learners, while the instruction relied heavily on readings and lectures. On the other hand, they found that there was no such mismatch between sequential students and the traditional engineering education. These results were found in the engineering field of study, the present study sought to investigate the generalizability of these findings to all the other fields of study at the university level.

Learning Styles and Academic Achievement

A few studies examined the relationship between the learning styles and academic achievement of university students. Some of these studies found that learning styles of high achieving students were significantly different from those of the low achieving students (Al-Baily, 1997). For example, High achieving students reported significantly higher scores than the low achieving students on the following learning styles: Deep Processing, Elaborative Processing, Fact Retention, and Methodical Study (Gadzella & Baleglu, 2003). High achievers also used more Tactile learning style than low achievers (Jenkins, 1991); had better scores than low achievers in reading and math on the following combination of learning styles variables: Motivation, Persistence, Responsibility, and Teacher Motivation (Caldwell & Ginther, 1996); and high achievers were significantly different from low achievers on the environmental variables of lighting, mobility, design, learning with others, and tactile/kinesthetic preferences vs. auditory/visual preferences (Dunn & Dunn, 1992).

Another body of research in this area found that instructors, if tailored their instructional styles to the students' learning styles, would improve the academic achievement of their students. For example, Zywno and Waalen (2002) conducted a quasi-experimental study to examine the influence of learning styles on academic performance in two types of learning environment: hypermedia assisted and conventional. The results of this study, using Felder and Silverman model ILS, showed that the largest increase in academic achievement was found among students of Active, Sensing, and Global LS. This result implied that matching the learning styles with modes of instruction could lead to increase in academic gains of university students.

Most of the previous researchers that fully or partially employed Felder and Silverman model of learning styles, used relatively small samples, employed descriptive statistical analyses, and implemented the model in a specific field of study, such as engineering. Most importantly, they investigated the learning styles of students attending Western universities located in geographically distinct locations, and having different cultural backgrounds than students enrolled at universities in the Arabic culture. Thus, there is an urgent need for research to be conducted in non-Western countries to investigate the generalizability of the Western findings.

The present study used quite a large sample of university students from very diverse fields of study, much broader than previous studies, and attempted to provide further elucidation on the conflicting results that have been found with regard to the possible differences in learning styles between males and females and among students of different fields of study. Moreover, the present study applied a predictive method of analysis rather than a descriptive one used by most of the previous studies.

Hence, the present study was designed to address three primary questions as follows:

1. What are the preferred learning style of Bahraini university students, using Felder and Silverman model of learning styles?
2. What are the differences among the learning styles of the Bahraini students according to their Gender and Field of study?
3. What are the predictors of Bahraini university students' GPA based on their preferred learning styles?

Method

Participants

Participants consisted of 877 Bahraini university students. The sample had 265 males (30.2%), 610 females (69.6%), and two participants did not report their gender. The ages of the sample ranged from 17 to 30, with a Mean of 20.9 (*SD* of 2.0). The students who participated in this study were randomly selected from all the academic colleges at University, with a total student population of about 18,000. The distribution of the sample amongst the different academic colleges was as follows: College of Arts ($n = 140$, 16%), College of Business Administration ($n = 152$, 17.3%), College of IT ($n = 110$, 12.5%), College of Law ($n = 120$, 13.7%), College of Engineering ($n = 111$, 12.7%), College of Education ($n = 143$, 16%), College of Sciences ($n = 101$, 11.5%).

Instruments

The Index of Learning Styles was used in this study. The instrument was created by Felder and Solomon in 1997 and was designed to assess the preferences of students on four dimensions of the learning style model formulated by Felder and Silverman (1988). The ILS consists of forty-four-item forced-choice instrument with option (a or b). It embraces four scales, each with eleven items, namely: Active- Reflective, Sensing-Intuitive, Visual-Verbal, and Sequential-Global Learning Styles. Subtracting the lower score from the higher one of either a or b will result in a score indicating the learning style that the individual acquires. For example, a score of 2 a and 9 b for a participant in the Active / Reflective category, will result in a score of 7b, indicating that he/she is a reflective learner. A paper-and-pencil version of the instrument was put on the World Wide Web in 1996 and an online version was added in 1997 (Felder& Brent, 2005; Felder & Solomon, 1997).

With respect to the psychometric properties of the ILS scale, Felder and Brent (2005) indicated that the instrument had moderate reliabilities ranging from 0.56 for Sequential-Global LS to 0.70 for Sensing-Intuitive LS. The present study applied the ILS on a pilot sample of 45 students, and Cronbach's alpha values were 0.70, 0.69, 0.78, and 0.71, for Active-Reflective, Sensing-Intuitive, Visual Verbal, and Sequential-Global, respectively. The test-retest method of reliability was applied after a two week time-period between the first and second application, and the reliabilities were: 0.80, 0.85, 0.87, and 0.81 for Active-Reflective, Sensing-Intuitive, Visual-Verbal, and Sequential-Global learning styles, respectively. The instrument was translated by the author from English into Arabic and the translation was then checked by three bilingual judges in the Psychology Department at the University to ensure accuracy and consensus.

Academic achievement is indicated by the cumulative Grade Point Average (GPA),

ranging from 0-4, which is adopted by the university as a grading system.

Procedure

Students with psychology majors enrolled in four advanced educational psychology classes participated in the study. The participating students were then instructed by the author and a colleague on how to administer the instrument. The trainees were instructed to apply the instrument to students individually on campus in one of the seven academic colleges at the university. All the participants completed anonymous self-report questionnaires privately on campus outside of the classroom. Special instructions were given to participant to ascertain equivalence across the students from different colleges. The completion of one of the questionnaires took approximately 10–15 minutes. All participation was voluntary.

Results

To answer the first research question regarding the preferred learning styles of university students on each of learning styles dimensions, a series of *t* tests for independent samples was calculated and the results are reported in Table 1.

Table 1
Differences in Learning Styles of Sample Using t-Test

Learning Styles		<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>
Active-Reflective	Active	620	4.30	2.65	***42.63	621
	Reflective	253	-2.68	1.97		
Sensing-Intuitive	Sensing	682	4.59	2.67	***39.46	379
	Intuitive	193	-2.68	2.13		
Visual-Verbal	Visual	741	5.91	3.01	***38.55	222
	Verbal	133	-2.87	2.29		
Sequential-Global	Sequential	559	3.84	2.50	***40.89	707
	Global	312	-2.89	2.23		

*** $p \leq .001$

The results in Table 1 show that the *t* value of the mean differences of each of the four dimensions of learning styles was significant. Hence, for Active-Reflective LS, $t(621) = 42.63$, $p \leq .001$; for Sensing-Intuitive LS, $t(379) = 39.46$, $p \leq .001$; for Visual-Verbal LS, $t(222) = 38.55$, $p \leq .001$; and for Sequential-global LS, $t(707) = 40.89$, $p \leq .001$. Examining the means of students' scores on different learning styles in Table 1 shows that the Bahraini university students preferred the following learning styles: Active over Reflective, Sensing over Intuitive, Visual over Verbal and Sequential over Global. Results further showed that Visual LS had the highest mean, indicating that Visual LS was the most preferred learning styles by Bahraini university students.

In order to answer the second research question regarding Gender effect and Field of Study effect on student learning styles, means and standard deviations of student learning styles according to gender and fields of study were calculated and reported in Table 2. A Multivariate Analysis of Variance (MANOVA) was performed. Results are in Table 3.

Table 2
Means and Standard Deviations of Learning Styles for
Gender and Fields of Study ($n = 877$)

Variables	Learning Styles							
	Active/ Reflective		Sensing/ Intuitive		Visual/ Verbal		Sequential/ Global	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Gender								
Males ($n = 265$)	2.43	4.13	2.26	4.13	4.33	4.55	1.13	3.87
Females ($n = 610$)	2.21	3.96	3.30	3.85	4.68	4.15	1.55	4.08
Fields of Study								
Arts ($n = 140$)	2.54	4.43	3.62	3.67	4.30	4.62	1.56	3.91
Business ($n = 152$)	1.79	4.37	3.03	4.04	4.57	4.37	1.31	3.98
IT ($n = 110$)	3.21	3.66	2.25	4.12	4.48	4.11	1.24	3.71
Law ($n = 120$)	1.51	3.81	3.37	3.71	3.97	4.25	1.92	3.69
Engineering ($n = 111$)	2.52	3.59	2.78	4.13	4.58	4.23	0.82	3.92
Education ($n = 143$)	2.88	3.68	3.29	3.75	5.47	4.19	2.09	3.96
Sciences ($n = 101$)	1.34	4.00	2.98	3.96	4.56	4.29	1.42	4.02

Table 3
Results of MANOVA for Effect of Gender and
Field of Study on LS Dimensions

Source	<i>LS</i>	Sum of		Mean	<i>F</i>
		Square	<i>df</i>	square	
Gender	Act./Ref.	8.31	1	8.31	0.52
	Sen./Int.	189.21	1	189.21	12.30***
	Vis./Ver.	22.70	1	22.70	1.25
	Seq./Glob.	7.66	1	7.66	0.47
Field of Study	Act./Ref.	341.97	6	56.99	3.60**
	Sen./Int.	138.44	6	23.07	1.49
	Vis./Ver.	15.23	6	2.54	0.14
	Seq./Glob.	134.04	6	22.34	1.38
Gender x Field of Study	Act./Ref.	77.86	6	12.97	0.82
	Sen./Int.	60.41	6	10.06	0.65
	Vis./Ver.	198.17	6	33.02	1.81
	Seq./Glob.	90.71	6	15.11	0.93
Error	Act./Ref.	13589.42	859	15.82	
	Sen./Int.	13254.96	859	15.43	
	Vis./Ver.	15609.52	859	18.17	
	Seq./Glob.	13845.71	859	16.11	

** $p \leq 0.01$; *** $p \leq 0.001$

Results of the MANOVA revealed a significant Gender main effect, Wilks's lambda = .98, $F(4, 856) = 3.75$, $p \leq 0.01$, $ES = .02$) and a significant Field of Study main effect, Wilks's lambda = .96, $F(24, 2987) = 1.62$, $p \leq 0.05$, $ES = .01$. There was no significant interaction between Gender and Field of Study. A follow-up ANOVA showed that the Gender main effect was attributed to Sensing/Intuitive learning styles, $F(1, 859) = 12.30$, $p \leq 0.001$, $ES = .01$. Lower LS means for males compared to females in Table 1 indicated males preferred Intuitive LS and females preferred Sensing LS.

A follow-up ANOVA also indicated that the Field of Study main effect was attributed to the Active/ Reflective Learning Style $F(6, 859) = 3.60, p \leq 0.01, ES = 0.02$. In order to determine which Field of Study mean differences were significantly different from one another on measures of learning styles, a Scheffé test for post-hoc comparisons ($\alpha < .05$) was performed for the Active/Reflective Learning Style.

The results showed that the significant mean differences in learning styles were between students in the College of IT and those in the College of Law (M -diff of 1.65) and the College of Sciences (M -diff of 1.87). The IT students who had higher LS means were found to be more Active learners than law students and science students (see Table 2). The results further show that the mean difference in learning styles was significant between students in the College of Education and those in the College of Sciences (M -diff of 1.55), and the education students who had higher LS means were more Active learners than the science students (see Table 2).

To answer the third research question regarding the contribution of the four learning styles to the students GPA, a Linear Multiple Regression was applied by entering the independent variables all simultaneously in one step, and the results are reported in Table 4.

Table 4
Simultaneous Multiple Regression
Analysis for GPA predictors

GPA Predictors	R^2	F		
	0.15	3.34**		
	B	SEB	β	t
Active/ Reflective LS	-0.00	0.01	-.01	-3.96
Sensing/ Intuitive LS	-0.00	0.01	0.01	-.18
Visual/ Verbal LS	-0.02	0.01	-0.10	-2.57*
Sequential/ Global LS	1.66	0.01	0.10	2.65**

** $p \leq .05$; *** $p \leq .01$

The results of the Linear Multiple Regression in Table 4 show that $R^2 = 0.15, F = 3.34, (p \leq 0.01)$, indicating that the model explained 15% of the variance in the student GPA, and that the only predictors of student GPA were the following learning styles: Visual/Verbal LS ($B = -0.02, \beta = -0.10, t = -2.57, p \leq 0.05$) and Sequential/Global LS ($B = 1.66, \beta = 0.10, t = 2.65, p \leq 0.01$). The results also show that Visual/Verbal LS was negatively related to student GPA, whereas Sequential/Global LS was positively related to student GPA.

Discussion

The present study investigated the preferred learning styles of Bahraini university students. The study also examined the differences among these learning styles according to gender and field of Study. It further examined the contribution of learning styles as predictors of students' GPA. With respect to the first research question regarding the most preferred learning style among Bahraini university students', results showed that it was the Visual LS. Results also showed that the preferred learning styles on each of the four dimensions were: Active over Reflective, Sensing over Intuitive, Visual over Verbal,

and Sequential over Global. 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 (Constant, 1997; Litzinger et al., 2005; Zywno, 2003) and that students, in general, had different learning styles (Constant, 1997; De Vita, 2001; Gadzella & Masten, 1998; Litzinger et al., 2005; Lopez, 2002; Stewart & Felicette, 1992; Zywno, 2003). Hence, the educational implication would be that Bahraini university students should be encouraged to actively process information (i.e., physical activity, discussion), the type of information presented should be sensory (i.e., sound, sights); which should be presented through visual modality (i.e., pictures, illustrations), and the organization of the material should be sequential (i.e., step by step, logical). Future research should further investigate the learning styles of university students in similar Arabic culture to see whether or not the same pattern of learning styles prevails among other Arabic university students.

The second research question addressed the gender differences in learning styles and the result showed that males preferred the Intuitive LS, while females preferred the Sensing LS. This result confirmed the well-established gender differences in learning styles (Philbin et al., 1995; Dunn & Griggs, 1995; Keri, 2002; Litzinger, 2005; Miller et al., 1990).

Sensing learners are good at memorizing, learning facts, and solving problems by well known clear and explicit methods; they are detail-oriented and prefer to work in a routine predictable environment. Intuitive learners, on the other hand, are more imaginative and innovative and are good at understanding abstractions and discovering possibilities and relationships (Felder, 1996).

This result could be attributed to the child rearing practices in traditional cultures, such as the Bahraini culture, which endorses stereotyped gender roles for males and females. Arab males, who are expected to be the breadwinners of their families, enjoy more freedom outside the home and, therefore, are exposed to diverse experiences, allowing them to become more innovative and daring to seek out new possibilities. Females, on the other hand, are expected to stay indoors and live in a routine, secure, and predictable environment, where they perform daily household chores and take care of the children. In such confined environment, females can have more time to use sensory experiences, whereas, they have little opportunities of risk taking or ventures outside the home. Another explanation could be attributed to biological differences between males and females. Velle (1987) summarized the data on gender differences in sensory functions indicating that there females had more sensitivity to taste and smell than males and that these differences were attributed to the influence of sex hormones on females though the mechanism of this influence was not specified. Hearing differences have also been well documented and the evidence was strong that females had greater threshold sensitivity than males to sound, especially for pure tones, but the reasons behind this difference was not clear.

The educational implication of this result could be that instructors may have to make conscious and serious efforts to encourage females by relating what they learn to their lives and by using concrete examples and focusing on details, while providing males with ample opportunities for problem solving, reflections, imagination, while avoiding routine repetitive work.

With respect to the second research question regarding the Field of Study effect on student learning styles, the results showed that students in different colleges preferred different learning styles. For example, IT students were more Active than law students and science students. On the other hand, education students were more Active than science students. It is possible that the nature of IT instruction, focusing on computer skills and hands on experiences, encourages students to be more Active learners than law and science students. The same logic applies to education students whose training in teaching practices requires that they use Active LS as part of their training by applying new teaching methods and using some educational activities with children in classrooms and in field work projects.

While it might have been expected that IT students and education students would be Active learners and law students would be Reflective learners, it was surprising to find that science students, who are known to be actively involved in doing lab experiments, were found to be Reflective learners. One explanation could be that the College of Sciences at the University includes students with math majors, who are expected to be Reflective learners, and who may have outnumbered the other students with other majors, such as biology or chemistry, in the sample of this study. Consistent with this view, Stewart and Felicetti (1992) found distinct differences in the learning styles preferred by each of the majors within the business school. Future researchers should, therefore, seek to address the learning styles of university students of different specializations within each college, which may lead to different outcomes.

With respect to the third research question, the results of this study showed that Visual/Verbal LS and Sequential/Global LS were good predictors of student GPA and that Visual LS was negatively related to students GPA, and Sequential LS was positively related to their GPA. This result is consistent with previous studies, which confirmed that learning styles significantly contributed to academic achievement (Baloglu et al., 2002; Dunn & Griggs, 1995).

One could argue, based on this result, that the prevailing form of instruction at the university might be best suitable for Sequential learners who prefer step by step instruction rather than holistic or problem solving approaches preferred by Global learners. The teaching instruction at the University might also match Verbal learners who benefit more from spoken words, explanation, and lecturing in class.

Consistent with this result, some researchers have postulated that the prevailing university teaching styles more closely match Sequential and Verbal learning styles (Felder & Spurlin, 2005). Similarly, Zywno (2003) has maintained that the conventional form of instruction applied to engineering students favors reflective learners, since students in lectured courses are passive and sequential learners, as most courses follow a rigid sequence.

It is interesting to note that this study found that the most preferred learning style of students was Visual LS; however, it was negatively related to students GPA. Visual learners get more information from visual images (pictures, diagrams, graphs, schematics, demonstrations) than from verbal material (written and spoken words and mathematical formulas), and vice versa for verbal learners. If something is simply said and not shown to visual learners (e.g. in a lecture) there is a good chance they will not retain that information.

This may also explain the poor academic achievement of some university students by the mismatch between their learning styles and the prevailing teaching styles. Most students in classes seem to be visual learners, while the information presented in almost every lecture course is overwhelmingly verbal. It may not be surprising, therefore, that many of Bahraini university students cannot reproduce information that was presented to them not long before, as the information verbally presented may not have been absorbed.

The educational implication could be that university instructors may be able to improve the academic achievement of their students by focusing more on visual instruction that matches the predominantly visual learning style of students, for instance, by using more visual aids (i.e. charts, pictures, illustrations, demonstrations).

It is worth mentioning, however, that in order to function effectively in any academic field, students are required to work well in all of the learning style modes. If university teaching has mainly focused on the least preferred learning styles of students, this may instigate student anxiety, and thus, interfere with their learning. On the other hand, if teaching exclusively focused on the preferred learning styles of students, they may not develop the mental flexibility they need to reach their potential for achievement. The objective of university teaching should, therefore, help students develop their skills in both their preferred and less preferred modes of learning. The proposed learning style model provides a good framework for designing instruction with the desired breadth, but the real goal is to make sure that the learning needs of students in each category within the model are met, which is known as "teaching around the cycle" (Felder, 1996).

Conclusion

The 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 study further attempted to examine the contribution of learning styles as predictors of the academic achievement of students, measured by their GPA. The author of this study adopted the Felder and Silverman (1988) model of learning styles as a theoretical framework. The findings showed that students preferred certain styles over others and that males were more intuitive learners while females were more sensing learners. Results also showed that IT students were more Active learners than law students and science students and education students were more active learners than science students. Results also showed that the Visual/Verbal and Sequential/Global learning styles were good predictors of student academic achievement. It is important to note, however, that in spite of the findings that have been achieved in this study, some fundamental issues require a greater in depth understanding. Firstly, the analysis that has been used to determine the contribution of learning styles to academic achievement in the present study was correlational and not causal; hence any generalizations in this regard should be treated with caution. Secondly, the instrument used in this study was based on a forced-choice questionnaire that attempted to categorize respondents into one style or another, hence may not have reflected the true learning style of the students. Thirdly, it would be suggested that a multi-dimensional model of assessment and matching could be more beneficial for students of diverse cultures than linear ones that have been historically used. Future researches should attempt to resolve these issues so that understanding student learning styles would, hopefully, achieve the ultimate goal of

promoting student academic achievement and ameliorating the quality of instruction in higher education institutions.

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