

Learning Style Preferences among College Students

Lamya Alkooheji¹ & Abdulghani Al-Hattami²

¹ College of Arts, University of Bahrain, Bahrain

² Bahrain Teachers College, University of Bahrain, Bahrain

Correspondence: Lamya Alkooheji, College of Arts, University of Bahrain, Bahrain. E-mail: lalkooheji@gmail.com

Received: June 8, 2018

Accepted: July 10, 2018

Online Published: September 27, 2018

doi:10.5539/ies.v11n10p50

URL: <https://doi.org/10.5539/ies.v11n10p50>

Abstract

The purpose of this study was to determine what factors other than individual preferences affect undergraduate students' learning style preferences, if learning style is influenced by gender, age, college affiliation and/or type of activities. A total of 185 students from the University of Bahrain, Bahrain, participated in an online VARK (Visual, Aural, Read/Write and Kinesthetic) for younger people questionnaire. The questionnaire consisted of 16 items about learning style preferences and three about participants' demographics. The results showed that participants generally preferred multi-modular learning style with both kinesthetic and visual learning styling being most preferred while Reading/Writing was the least preferred. Furthermore, there were statistically significant differences between students learning styles based on age and gender, but it was a moderate difference. What mostly affected the preferences, however, was the type of activities or tasks, something which in turn resulted in some difference among colleges. This suggests that VARK preferences need to be related to activity type rather than be observed at individual reference. Recommendations were provided at the end of the study.

Keywords: learning styles, VARK, teaching methods, university courses, learning modes

1. Introduction

1.1 Learning Styles

Learning style can be defined as 'the way people absorb process and retain information' (De Bello, 1990, p. 203). One of the popular learning style models is the model developed by Neil Fleming in 1987. The model identifies four primary types of learning styles: visual, auditory, read/write and kinesthetic, the initial of which are used to name the model the VARK model (Fleming & Baume, 2006). The model suggests that each learner has different learning preferences to which he or she responds better than others. Despite the fact that the theory of learning style went viral in the 1970s, it has been debatable since, and has even become doubtful as time passed. While there is some research that indicated that there were some significant differences based on some factors, other research refuted the whole theory.

There are various learning style theories; some of 'which are more personality/motivation based' and others are more 'educationally based' (Howie, 2011, p. 47). It mainly focused on matching instructional style with individual learning preferences. Learning style preference is said to be influenced by a number of factors, some of which have more effect on certain learners or in certain stages than others. For example, when Ramayah et al. (2011) examined the effect of peer, technology, cultural background on learning style of business school students, they found that peer affected all four types of learning style, technology affected reading and writing, while cultural background of the learner affected visual, aural and kinesthetic learning styles of the participants. There have been several other studies confirming the effect of culture (Charlesworth, 2008; De Vita, 2010; Lee, 2011; Song & Oh, 2011). A study more specific about the cultural effect found that cultural differences were 'marginally significant' when it comes to variability in preference for active experimentation over reflective observation, something which was rather affected by age and area of specialization, while culture had a significant effect on the choice between abstract learning style and reflective learning style (Joy & Kold, 2009). However, there is less agreement on the effect of age on learning styles. For example, some found a strong correlation (Cornu, 1999; Hlawaty, 2008), many either found low correlation (Lincoln et al., 2006) or no significant relation (Li, Chen, Yang, & Liu, 2010; Adesunloye, Aladesunmi, Henriques-Forsythe, & Ivonye, 2008).

1.2 Age and Gender Differences

A number of studies have shown a relationship between age and learning style preferences of the students (Raddon, 2007). Cornu (1999) examined the relationship between learning style, gender, and age. He found no significant correlation between learning styles with both gender and age. Wehrwein, Lujan, and DiCarlo (2007) also searched the relationship between gender and learning style preferences among undergraduate psychology students. They found a significant relationship between these two variables.

Among many factors that may sometimes affect learning style preferences is gender. Tatarintseva (2002) explains that '[t]his problem is scientific and pedagogical interest since one goal for education is to provide equal opportunities for males and females'. This difference has been examined and addressed at many educational levels. Tatarintseva (2002), for example, examined the theory of gender differences in learning styles at secondary school. Wehrwein et al. (2007) compared learning style preferences of male and female psychology undergraduate students and found that the preferred learning styles of female participants differed than those of male participants in several ways. First, more than half of the female participants preferred unimodals whereas more than half of the male ones preferred multimodal, specifically quadmodal.

1.3 Impact of Learning Styles on Academic Performance

A considerable number of studies have investigated the relationship between learning styles and students' academic achievement, student attitudes, and student behavior at the primary and secondary school level (Griggs & Dunn, 1984; Smith & Renzulli, 1984) and at the college level (Brown, 1978; Charkins et al., 1985). A number of them have found significant relationships between the learning styles and students' academic achievement (Kopsovich, 2001). Bennett (1993) believes that it is necessary to count for the relationship between learning styles and academic achievement on a country-context perspective.

Gokalp (2013) investigated the relationship between students' learning styles and their academic success. He found statistically significant differences between learning styles and academic success. Jilardi-Damavandi, Mahyuddin, Elias, Daud, and Shabani (2011) examined the impact of learning styles on the academic achievement. They found that there was a statistically significant difference in the academic achievement of the students' learning styles. Results have not always been consistent. For example, in a study examining the relationship between students' learning styles and their academic achievements, Gappi (2013) found that there was no significant relationship between students' academic achievements and students' learning style preferences.

1.4 Teaching Style and Learning Style

Regardless to how learning styles are defined or categorised some teachers feel the urge to match their teaching style with their students' learning style instead of them expecting the students to accommodate to teacher's teaching style (Dunn & Dunn, 1979). However, there have been a number of studies that do not support learning style theory (Rogowsky, Calhoun & Tallal, 2015), and this raises a question: are there individual preferences or is there a different factor affecting learning style preferences? This paper sets to find what actually makes university students prefer a learning style over another.

One major criticism against VARK learning styles is that categorising learners into learning styles can impair motivation to improve one's skills. Secondly, although there are a considerable number of studies illustrating preferences in learning styles among certain groups of learners, no or only weak studies have proven that focusing on individual's preferred learning styles in teaching (or learning) would yield better results than not doing so (Pashler et al., 2009; Mayer, 2011).

Since some research asserted that there were patterns in learning style preferences despite the fact that the criticism of the theory of learning style keep growing, the authors attempted to understand if and how learning style preferences is something that would be inspected and identified among university students. The purpose of this study is to determine if there are any specific factors other than individual preferences that significantly affect undergraduate students' learning style preferences between the College of Arts, Science, Engineering and IT at the University of Bahrain. The findings can be used to guide the choice among the four learning skills when designing a course or an activity. This in turn should help teachers to increase learner's satisfaction with the learning environment by adapting the activities to be sensitive to students' needs.

2. Methodology

2.1 Sample

A total of 185 students, 142 (77 per cent) females and 43 (23 per cent) males, from the University of Bahrain, Bahrain, took part in the survey (Note 1). In total, 29 were from Arts College, 2 males and 27 females (age average

= 21.34); and 46 were from Science College, 0 males and 46 females (age average = 19.98), 31 were from Engineering College, 13 males and 18 females (age average = 20.29), and 79 were from IT College, 28 males and 51 females (age average = 20.44).

2.2 Instrument

An online VARK for younger people questionnaire was used to collect data. The questionnaire is provided in the appendix. It consisted of 19 items, three asking for age, gender and colleges and the other 16 items were about learning style preferences, with four options (Visual, Auditory, Read/Write, Kinesthetic) provided to choose from, and participants could choose more than one option per item. The survey questions were copied from the following webpage (<http://vark-learn.com/the-vark-questionnaire/the-vark-questionnaire-for-younger-people/>). Leite et al. (2010) provided evidence of the validity of the VARK for measuring learning preferences. They also found that the estimated reliability coefficients to be adequate. The reliability estimates for the scores of the VARK subscales were .85, .82, .84, and .77 for the visual, aural, read/write, and kinesthetic subscales, respectively, which are considered adequate given that the VARK is not used for high-stakes decisions.

They were also translated into Arabic by the first author (An English Language Professor) and then back translated from Arabic to English to ensure the accuracy of the translation. Each item and option was presented in both English and Arabic, side-by-side as shown in Appendix A. The internal validity of the survey was examined by Fitkov-Norris and Yeghiazarian (2015). They found that the instrument could potentially be used as a predictor for a person's learning style preference. All analyses were performed using SPSS, Version 25.

2.3 Procedure

The first researcher made a link to the survey available on her personal webpage, and asked her students during classes to fill the questionnaire and send the link to their colleagues in the same college. The participation to answer the survey was voluntarily. Clear instructions were given to the students on how to fill the survey and their ability to choose more than one option. The survey was kept open from 24th February to 20th March 2017. The collected responses were then inserted in an Excel sheet, and sorted according to question, to gender, to age group and to college. Then participants' preferences were grouped to explore the collective responses to identify any possible patterns.

3. Results and Discussion

3.1 What Is the Most Learning Style Preferred by Uob Students?

The results showed that University of Bahrain students learning style preference starts with kinesthetic (1215 counts), followed by visual (1183 counts), auditory (1022 counts) and lastly read/write (918 counts).

Table 1. Frequency of students' choices for their preferred learning style

Learning Style	Visual	Auditory	Read/Write	Kinesthetic
Q#1	16	<u>85</u>	<u>69</u>	31
Q#2	<u>83</u>	56	36	<u>80</u>
Q#3	56	<u>114</u>	17	<u>91</u>
Q#4	<u>85</u>	<u>88</u>	24	75
Q#5	<u>83</u>	32	50	<u>108</u>
Q#6	<u>83</u>	63	38	<u>128</u>
Q#7	<u>97</u>	68	31	<u>70</u>
Q#8	61	<u>71</u>	54	<u>66</u>
Q#9	<u>91</u>	49	21	<u>130</u>
Q#10	61	<u>95</u>	<u>91</u>	50
Q#11	<u>69</u>	46	<u>91</u>	59
Q#12	56	23	<u>121</u>	<u>64</u>
Q#13	30	<u>91</u>	<u>91</u>	51
Q#14	<u>125</u>	60	54	<u>81</u>
Q#15	<u>131</u>	37	<u>65</u>	57
Q#16	56	44	<u>65</u>	<u>74</u>
Total	<u>1183</u>	1022	918	<u>1215</u>
	<u>37%</u>	32%	29%	<u>38%</u>

The two most chosen learning styles were underlined.

Table 1 illustrates the number of choices of each option per question. The two most chosen learning style preferences were kinesthetic, followed closely by visual and then auditory, and reading/writing comes at last. The differences between the four are not huge, which indicate a tendency toward multi-module learning style, with some preference of both kinesthetic and visual.

However, when the questions and responses are sorted according to type of activity each question suggests, the results reveal a very interesting pattern. The authors marked the question according to the type of activity and presented in the following table:

Table 2. Survey questions according to learning preferences chosen and type of activity inquired about

Visual	Auditory	Reading/Writing	Kinesthetic
Q2: learning new computer game	Q1: making something special for the family	Q10: becoming a tutor or a leader for a holiday program	Q5: presenting idea in class Q6: your teacher using
Q7: learning to use a new digital camera or mobile	Q4*: the doctor explaining to you	Q11: hooking up a new computer	Q9: using a website to learn how to make a special graph
Q4*: the doctor explaining to you	Q3: giving directions to a nearby house	Q12: choosing a new digital camera or mobile phone	Q16: making a project about a play
Q15: preferring website	Q8: receiving feedback on an event, competition or test Q13: planning a surprise party Q14: deciding whether to go to watch a new movie		
Items related to: Technology	Short instructions	Requiring long details that are hard to memorise	institutionalised educational setting, direct learning or delivering of lessons and new information
Medical/health	Medical/health		

*As the analysis will show, the majority of responses to Q4 preferred visual learning style, but it does not fall under 'technology' category like the other ones in this column.

It can be seen from Table 2 above that the highly chosen preferred learning style per item had to do with the type of activity. When the questions were grouped according to the most chosen response (underlined for each question in Table 1), a pattern was noticed. The items in each group of the four learning style had something in common, the *type* of activity. Items 2, 7 and 15, to which the most frequent preference was visual learning style, were items related to technology. Items 1, 3, 8, 13 and 14, to which the highest response was auditory, were activities that involved short instructions. Item 4 had almost equal choices of visual learning styles (85 choices) and auditory learning style (88 choices). This item was on how participants preferred to receive explanation from a doctor. The split between visual and auditory learning styles makes perfect sense as it can fit in under the first if considered technical and under the second if considered short instructions, depending on how the participants viewed it. When it comes to the third group of items, items 10, 11 and 12, for which participants preferred reading/writing learning style, these items were detailed and would not be immediately learnt by heart when received or delivered and thus required time to memorise/comprehend. The last group of item for which the most chosen learning style was kinesthetic style was items 5, 6, 9 and 16. What the items of this group had in common was that they were in institutionalised educational setting, direct learning or delivering of lessons and new information. This, however, raises the question whether even for the other previous categories students will still have a higher tendency to kinesthetic if the items consisted of examples in educational setting, while the tendency is towards visual, auditory and reading/writing in off college life. This cannot be determined by the current survey data.

3.2 Is There a Significant Gender Differences in the Learning Style Preference?

Table 3. Frequency of students' choices for their preferred learning style by gender

Learning Style	Visual		Auditory		Read/Write		Kinesthetic	
	Male	Female	Male	Female	Male	Female	Male	Female
Total	304	899	242	780	224	691	280	935
Percentage	29%	27%	23%	24%	21%	21%	27%	28%

A one-way between-groups multivariate analysis of variance was performed to investigate the gender differences in learning styles. Four dependent variables were used: Visual, Auditory, Read/Write, and Kinesthetic. The independent variable was gender. Although the results showed that there was a statistically significant differences between male and female students on the combined dependent variables, $F(4, 27) = 73.031$, $P < 0.05$; Wilks' Lambda = .084, the difference is not practically significant because both males and females prefer VAKR in order and almost equally. The results showed that male students learning style is visual (304 counts), followed by kinesthetic (280 counts), whereas female students learning styles is kinesthetic (935 counts), followed by visual (899 counts). However, the results indicate that both male and female students placed Auditory as the third preference (242 counts and 780 counts, respectively) and Reading/Writing as the fourth in their learning style preferences (224 counts and 691 counts, respectively).

Since the numbers of male and female participants were unequal, presenting the responses in percentages would make it possible to compare the choices of learning styles made by males and females to each survey item. The percentage representation is shown in Table 4.

Table 4. Percentages of students' choices for their preferred learning style by gender

Learning Style	Visual		Auditory		Read/Write		Kinesthetic	
	Male %	Female %						
Q#1	13.3	28.5	<u>35.0</u>	<u>34.4</u>	30.0	27.4	21.7	9.7
Q#2	25.9	20.8	19.0	12.7	<u>20.7</u>	<u>34.5</u>	<u>20.7</u>	<u>34.5</u>
Q#3	20.0	20.2	<u>40.0</u>	<u>41.3</u>	4.6	6.6	35.4	31.9
Q#4	<u>36.5</u>	29.7	31.7	<u>32.5</u>	6.3	9.6	25.4	28.2
Q#5	<u>37.7</u>	15.5	18.8	10.9	14.5	23.0	29.0	<u>50.6</u>
Q#6	23.1	27.8	26.9	17.9	5.1	14.5	<u>44.9</u>	<u>39.7</u>
Q#7	<u>43.1</u>	<u>34.6</u>	17.2	27.9	17.2	10.1	22.4	27.4
Q#8	25.0	25.9	<u>30.0</u>	26.9	20.0	21.3	25.0	25.9
Q#9	38.1	29.8	9.5	19.1	6.3	6.2	<u>46.0</u>	<u>44.9</u>
Q#10	<u>31.1</u>	17.0	27.0	<u>33.6</u>	28.4	31.4	13.5	17.9
Q#11	21.0	27.6	12.9	18.7	<u>43.5</u>	<u>31.5</u>	22.6	22.2
Q#12	12.7	23.9	7.9	9.0	<u>52.4</u>	<u>43.8</u>	27.0	23.0
Q#13	4.9	13.4	<u>39.3</u>	<u>33.2</u>	<u>36.1</u>	<u>34.2</u>	19.7	19.3
Q#14	<u>43.8</u>	<u>37.5</u>	18.8	18.8	11.3	18.8	26.3	25.0
Q#15	<u>45.3</u>	<u>45.1</u>	12.0	13.0	21.3	22.8	21.3	19.1
Q#16	26.2	22.5	18.0	18.5	<u>32.8</u>	25.3	23.0	<u>33.7</u>

Table 4 above shows the distribution of the choices per question for each gender (Note 2). In general, there are only a few questions to which chosen learning styles differed between males and females and the percentages of the responses in favour the most chosen learning style (V, A, R or K) seem to be rather close for each question. Out of 16 questions, the highest percentages of choices of both males and females were of the same learning style in nine questions (Questions, 1, 3, 6, 7, 9, 12, 14 and 15). For two questions, the first and second best preference of the two genders were very close (Questions 2 and 13), and in one question, the preference of the males were almost equally distributed among the four learning preferences, making none of the four preferences stand out as the most frequently chosen one to males (Question 8).

This leaves us with three questions to which males and females responses differed significantly: Questions 4, 5 and 16. If we refer to Table 3, in which questions were sorted according to type of activity, it will be noticed that these three questions are about the following situations:

Question 4: How the participants prefer a doctor to explain a knee problem he or she has

Question 5: How the participants prefer to present idea in class

Q16: How the participants prefer to make a project about a play

It is obvious that the three situations include interaction with others who are not close acquaintances- in Question 4 with a doctor and in Questions 5 and 16 with colleagues in a university course. The second and third are the only two questions in which the participants is asked about delivering a lesson or project in class. A higher percentage of female participants chose kinesthetic style in delivering a lesson or project while a higher percentage of male participants chose to visual options to deliver the lesson or project. As for the question on how they preferred a doctor to explain a health problem with their knees, 36.5% of the male participants were more comfortable with visual options, the same learning style repeatedly used for technical choices in this survey, while 32.5% of the male participants chose auditory learning style, the one more often chosen by the participants in general for social interactions.

3.3 Is There a Significant Difference Among Students in Their Learning Style Preference According to the College They Belong to?

Table 5. Frequency of students' choices for their preferred learning style by college specialization

College Learning Style	IT				Engineering				Arts				Science			
	V	A	R	K	V	A	R	K	V	A	R	K	V	A	R	K
Q#1	<u>26</u>	36	41	12	8	<u>16</u>	8	10	9	<u>12</u>	7	4	18	<u>21</u>	13	5
Q#2	33	30	14	33	<u>20</u>	6	9	10	<u>12</u>	7	5	<u>12</u>	18	13	8	<u>25</u>
Q#3	27	<u>55</u>	9	32	8	<u>17</u>	4	<u>17</u>	9	14	1	<u>18</u>	12	<u>28</u>	3	24
Q#4	31	<u>46</u>	10	23	<u>20</u>	13	3	14	15	7	3	<u>18</u>	19	<u>22</u>	8	20
Q#5	36	11	18	<u>43</u>	15	10	11	<u>19</u>	<u>15</u>	6	8	<u>16</u>	17	5	13	<u>30</u>
Q#6	41	28	14	<u>55</u>	10	17	4	<u>22</u>	9	7	11	<u>21</u>	23	11	9	<u>30</u>
Q#7	<u>39</u>	30	18	28	<u>21</u>	9	4	12	<u>15</u>	10	3	7	<u>22</u>	19	6	<u>23</u>
Q#8	26	28	26	23	11	10	8	<u>17</u>	11	10	7	12	13	<u>23</u>	13	14
Q#9	<u>47</u>	19	11	<u>47</u>	10	5	4	<u>26</u>	12	9	2	<u>20</u>	22	16	4	<u>37</u>
Q#10	28	<u>45</u>	<u>43</u>	23	11	11	<u>16</u>	7	<u>13</u>	<u>13</u>	11	5	9	<u>26</u>	21	15
Q#11	<u>33</u>	22	37	27	8	4	<u>20</u>	10	9	7	<u>16</u>	6	<u>19</u>	13	<u>18</u>	16
Q#12	24	16	<u>54</u>	25	7	4	<u>20</u>	11	9	1	<u>20</u>	11	16	2	<u>27</u>	17
Q#13	10	35	<u>43</u>	23	2	<u>20</u>	11	8	7	<u>15</u>	10	8	11	21	<u>27</u>	12
Q#14	<u>54</u>	19	24	27	<u>23</u>	14	8	18	<u>20</u>	16	8	13	<u>28</u>	11	14	23
Q#15	<u>59</u>	14	32	21	<u>23</u>	10	6	17	<u>20</u>	3	13	6	<u>29</u>	10	14	13
Q#16	<u>33</u>	20	24	<u>33</u>	4	11	14	10	4	6	<u>10</u>	<u>11</u>	15	7	17	<u>20</u>
Total	<u>547</u>	454	418	475	201	177	150	<u>228</u>	<u>188</u>	143	135	<u>189</u>	291	248	215	<u>324</u>

A one-way between-groups multivariate analysis of variance was performed to examine if college students differ in their learning styles. Four dependent variables were used: Visual, Auditory, Read/Write, and Kinesthetic. The independent variable was college affiliation. The results showed that there was a statistically significant differences between the students in the four colleges on the combined dependent variables, $F(12, 151) = 27.042$, $P < 0.05$; Wilks' Lambda = .048. The results showed that IT college students prefer visual learning style (547 counts), followed by kinesthetic (475 counts), then auditory (454 counts), and then read/write (418 counts). Arts students put similar emphasis on visual (188 counts), kinesthetic (189 counts) auditory (143 counts), and then read/write (135 counts). Students of both Engineering and Science colleges prefer kinesthetic learning style (228 counts, 324 counts, respectively), followed by visual (201 counts, 291 counts, respectively), then auditory (177 counts, 248 counts, respectively), and read/write (150 counts, 215 counts, respectively).

In the four colleges, Reading/Writing were least preferred learning styles, Auditory learning style was slightly more preferred yet with close total frequencies of that of Reading/Writing style. Kinesthetic learning style and Visual learning styles were more preferred among the four colleges with slight differences: IT students preferred Visual most, Engineering and Science students preferred Kinesthetic, while Arts students almost equally preferred Kinesthetic and visual. However, the difference between colleges, though not vast, can be associated with type of activity courses of each college normally uses. If compared to the four categories this study has deduced above (see Table 3), IT College uses more technology, engineering students more dependent on students presenting/creating

their work in class, while Arts students, depending on their specialty, may need one more than the other, which could have divided their preferences between Kinesthetic and Visual.

3.4 Is There a Significant Difference Among Students in Their Learning Style Preference According to Students' Age Group?

Table 6. Frequency of students' choices for their preferred learning style by age

Age	Group 1				Group 2				Group 3			
	16-18				19-21				22-24			
Learning Style	V	A	R	K	V	A	R	K	V	A	R	K
Q#1	5	16	9	5	34	47	37	17	22	22	23	9
Q#2	11	10	5	10	50	30	20	45	22	16	11	25
Q#3	12	17	2	16	30	63	14	52	14	34	1	23
Q#4	13	13	6	8	51	50	14	37	21	25	4	30
Q#5	14	3	10	12	44	17	30	64	25	12	10	32
Q#6	13	6	5	23	43	35	22	69	27	22	11	36
Q#7	16	6	5	12	55	37	17	48	26	25	9	10
Q#8	10	11	2	11	32	41	33	38	19	19	19	17
Q#9	16	4	2	20	46	27	10	79	29	18	9	31
Q#10	8	14	13	12	29	48	56	29	24	33	22	9
Q#11	8	7	11	10	36	25	51	35	25	14	29	14
Q#12	4	2	18	10	31	13	67	38	21	8	36	16
Q#13	2	13	18	5	15	55	49	13	13	23	24	15
Q#14	22	7	9	12	70	33	31	44	33	20	14	25
Q#15	16	3	13	10	72	23	33	36	43	11	19	11
Q#16	10	6	12	8	30	31	35	39	16	7	18	27
Total	<u>180</u>	138	140	<u>184</u>	<u>668</u>	575	519	<u>683</u>	<u>380</u>	309	259	<u>330</u>

A one-way between-groups multivariate analysis of variance was performed to examine if students differ in their learning styles according to their age. Four dependent variables were used: Visual, Auditory, Read/Write, and Kinesthetic. The independent variable was age. Students were categorized into three age groups, Group 1: 16-18, Group 2: 19-21, and Group 3: 22-24. The results showed that there was a statistically significant differences between three age groups on the combined dependent variables, $F(8, 84) = 55.69$, $P < 0.05$; Wilks' Lambda = .025.

In general, they all preferred Visual and Kinesthetic with trivial difference between the two preferences in each age group. To be more specific, first age group almost preferred Visual and Kinesthetic equally, and almost preferred Reading/Writing and Auditory equally. To the second age group, Kinesthetic style was best preferred, while for the third group, Visual was much more preferred. To both the second and third group, Reading/Writing style was least preferred.

4. Discussion

It has become obvious that there are learning styles preferences, and they are, to an extent, affected by age, gender and college affiliation. However, the major factor was an external one: the *type* of activity. Technology-related activity are better delivered visually, simple instructions and interactions are preferred to be delivered orally (i.e. heard), long detailed instructions and steps are preferred to be delivered in writing. As for activities with social nature, Auditory learning are preferred, while classroom-based and activities of academic nature other than technological nature and that require a party (either an instructor or a student) to deliver to the rest of the class a lesson, Kinesthetic learning style is preferred.

Although reading and writing skills are the major and most intensively used skills to find and learn information in different fields and discipline, and despite them being what schools start teaching from the very beginning of the educational journey, students still reach university with little interest in using reading and writing skills to acquire knowledge. The results in this research, whether according to gender, college or age, have confirmed that reading and writing was the least preferred learning style. This finding conforms to the findings of several other studies (cf. Hoefl, 2012; Kharb et al., 2013).

The results according to college preferences showed that Arts students preferred Visual, Kinesthetic (the results were very close), followed by Auditory and then Reading/Writing. However, since almost all the participants were

mainly females (27 females vs. 2 males) at Arts College, the results are more likely to reflect female Arts students' learning preferences than male Arts students' learning preferences. Although the survey inquired about the college and not the specialisation of the students, it is worth mentioning that at the University of Bahrain, there are five departments under this college, and they are the Department of English Language and Literature, the Department of Arabic Language and Islamic Studies, the Department of Social Sciences, the Department of Psychology and the Department of Information, Tourism and Fine Arts, all except the fifth are heavily reliant on reading and writing. Still, almost all participants from this college still showed very low interest in reading and writing.

Auditory learning style preference is the second lowest, represented at college by instructor lecturing. Still preferred to reading and writing, but the fact it was the third preference according to gender, college and age makes the fact that lecturing being the main means of delivering not very effective, or at least not attractive. The solution is to constantly incorporate visual and/or kinesthetic styles with it. Incorporating visual elements is the easiest and least demanding for all disciplines, and can be done by steps as simple as using graphs and pictures while talking, whether referring to ones in the book or displaying ones in class, and so on. Kinesthetic learning style will be the more demanding one. It is, however, worth investing time in, since it is likely to dramatically improve students' performance since it is most of the time their first or second choice according to the results of this study.

In attempt to understand how instructors could increase compliance with reading tasks at university level, Hoefft (2012) compared the results of using different incentive to university students who were given reading assignments. She found that frequent reminders had no impact, but requiring students to either write journals using a fixed survey at the end of each reading assignment or giving them quizzes were more useful. Interestingly, the reading comprehension level was lower of the students who had to complete journals than of those who had to take quizzes after the reading task. When students were asked to explain the level difference, they said that since journal questions remained constant, 'they got into a pattern of skimming reading material in search of responses to journal questions' (ibid. 15) whereas quizzes required more careful reading in order to be prepared for the quiz (ibid.). This suggest that quizzes for reading comprehension tasks can generate better results and are a better incentive to learn more from reading comprehension tasks at university when teaching reading skills in a language course.

5. Conclusion

This paper has explored what mostly makes university students prefer a learning style over another and what affects preferences. It has surveyed undergraduate students from four colleges at the University of Bahrain: the College of IT, the College of engineering, the College of Arts and the College of Science. The findings have shown that age and gender had some, but limited effect on students' preferences. However, the type of activity had the most significant effect on learning style preferences. This may proclaim the validity of learning styles, but not as something strongly determined by individual preferences but rather by situations and contexts. Additionally, there was a slight difference according to college as the order of preferences for IT students was Visual, Kinesthetic, Auditory and then Reading/Writing in order, while the other three colleges order of preferences was Kinesthetic, Visual, Auditory and then Reading/Writing.

Overall, reading and writing, which are supposedly the most important educational skills and tools, are least important and preferred among the participants in this survey. We personally think this is due to the fact that many schools and university courses do not adequately improve students reading and writing abilities and skills and thus making these skills least preferred. Reading is tough for most of them, and, accordingly, writing is challenging and demanding.

The fact that auditory learning style did not prevail anywhere is also alarming. Lecturing is the main teaching method. Most of what we teach is lectures, or we are having students talk to present, again: mainly, though not exclusively, auditory. This raises the question of how much academics and teachers are actually engaging their students in the learning process. The findings of this study call for re-designing reading and writing courses to better enable students to use these skills more comfortably and for reducing lecturing in classes and replacing it with other options in which students learns actively. Additionally, video lectures and classes with visual effects and presentations should be made available online for most, if not all, of the courses too.

6. Recommendations

First, more experimental longitudinal research is needed into examining if applying individually preferred learning styles does actually improve or enhance or impair learning by testing learners after applying preferred learning styles. Nevertheless, university educational programs should be designed to suit students' multiple learning styles and learning strategies for all levels in order to make teaching and learning processes more effective. It is also recommended that course design should be flexible enough to embrace a variety of learning styles.

To make the most of the fact that visual learning style is the most preferred among university students, it would be useful to teach, at an early stage the following skills: mind mapping, various note taking methods and using PowerPoint presentations effectively. Instructors may want to uploading videos for lessons, using images and graphs more than text and tables in class, and even pictures related to topics discussed to keep the students focused.

Language courses need to be redesigned to meet direct academic reading and writing skills as required by each college. Thus the courses should be designed in cooperation between language instructors on the one hand and academics in the other courses. The courses should target to teach language and style required to do in assignments, projects and exams. If language courses fail to prepare students for them, or teach skills and put pressure on them to fulfil tasks that will never be of use at college, students will be demotivated, and consider the language courses extraneous and unimportant, and will only focus on passing the courses or getting a certain grade, not learning. Therefore, tuning the courses to the college requirements is very important, while the colleges are the ones responsible to tune their requirements to the market needs. This is because different competences required for reading and writing not only reflects on academic achievement, but overall personality development. For example, a longitudinal study by Tõugu and Tulviste (2017) has proven that ‘children’s expressive vocabulary score showed main effects of extraversion, conscientiousness, and emotional stability.’

At college level, it is clear that IT students would benefit more from visual teaching and learning methods while both the College of Engineering and the College of Science would need to employ more Kinesthetic teaching and learning methods. As for the College of Arts, they would benefit from Kinesthetic and/or Visual teaching and learning styles depending on the field. However, the type of activity should play a major role on choosing or designing teaching and learning materials. This means that for certain courses, some learning styles should be used more than others.

One important recommendation is to improve academic reading and writing skills and improving language courses to directly serve reading and writing skills required at university level and for university courses. For example, if the means of instruction in a university is English, then this can be done in cooperation between ESP (English for Specific Purposes) instructors and instructor of specialised courses in the target colleges and explore the type of reading and writing the students in these college are required to do in their assignments and class activities on the one hand, and assessments on the other hand.

References

- Adesunloye, B. A., Aladesunmi, O., Henriques-Forsythe, M., & Ivonye, C. (2008). The preferred learning styles among residents and faculty members of an internal medicine residency program. *Journal of the National Medical Association, 100*(2), 172-175. [https://doi.org/10.1016/S0027-9684\(15\)31205-0](https://doi.org/10.1016/S0027-9684(15)31205-0)
- Bennett, M. J. (1993). Towards ethnorelativism: A developmental model of intercultural sensitivity. In M. R. Page (Ed.). *Education for the Intercultural Experience*, 21-71.
- Brown, R. (1978). The effects of congruency between learning styles and teaching styles on college student achievement. *College Students Journal, 12*, 307-309.
- Charkins, R. J., O’Toole, D. M. & Wetzel, J. N. (1985). Linking teachers and student learning styles with student achievement and attitudes. *Journal Economic Education, 111-120*. <https://doi.org/10.2307/1182513>.
- Charlesworth, Z. (2008). Learning styles across cultures: Suggestions for educators. *Education & Training, 50*(2), 115-127. <https://doi.org/10.1108/00400910810862100>
- Cornu, A. (1999). Learning styles, gender, and age as influential issues amongst Theology student. *Journal of Beliefs and values: Studies in Religion and Education, 20*(1), 110-114. <https://doi.org/10.1080/1361767990200111>
- De Bello, T. C. (1990). Comparison of eleven major learning style models: Variables, appropriate populations, validity of instrumentation, and the research behind them. *Journal of Reading, Writing, and Learning Disabilities, 6*, 203-222. <https://doi.org/10.1080/0748763900060302>
- De Vita, G. (2010). Learning style, culture, and inclusive instruction in the multicultural classroom: A business and management perspective. *Innovations in Education and Teaching International, 38*(2), 165-174. <https://doi.org/10.1080/14703290110035437>
- Dunn, R. & Dunn, K. (1979). Learning styles/teaching styles: Should they ... Can they ... be matched? *Educational Leadership, 36*(4), 238-244.
- Fitkov-Norris, E. & Yeghiazarian, A. (2015). *Validation of VARK learning modalities questionnaire using Raschanalysis*. In: 2014 Joint IMEKO (International Measurement Confederation) TC1-TC7-TC13

- Symposium: Measurement Science Behind Safety and Security; 03 - 05 Sep 2014, Madeira, Portugal.
- Fleming, N. & Baume, D. (2006). Learning Styles Again: VARKING up the Right Tree! *Educational Developments*, 7, 4-7.
- Gappi, L. L. (2013). Relationships between Learning Style Preference and Academic Performance of Students. *International Journal of Educational Research and Technology*, 4(2), 70-76.
- Gokalp, M. (2013). The Effect of Students' Learning Styles to their Academic Success. *Creative Education*, 4(10), 627-632. <https://doi.org/10.4236/ce.2013.410090>
- Griggs, S. A., & Dunn, R. S. (1984). Selected case studies of the learning styles preferences of gifted students. *Gifted Child Quarterly*, 28(3), 115-119. <https://doi.org/10.1177/001698628402800304>
- Hlawaty, H. (2008). A comparative analysis of learning styles of German adolescents by age, gender, and academic achievement level. *European Education*, 40(4), 23-25. <https://doi.org/10.2753/EUE1056-4934400402>
- Hoefl, M. E. (2012). Why University Students Don't Read: What professors can do to increase compliance. *International Journal for the Scholarship of Teaching and Learning*, 6(2), 10-19. <https://doi.org/10.20429/ijstl.2012.060212>
- Howie, D. (2011). *Teaching Students Thinking Skills and Strategies: A framework for cognitive education in inclusive settings*. London & Philadelphia: Jessica Kingsley Publishers.
- Jilardi-Damavandi, A., Mahyuddin, R., Elias, H., Daud, S. M., & Shabani, J. (2011). Academic Achievement of Students with Different Learning Styles. *International Journal of Psychological Studies*, 3(2), 186-193. <https://doi.org/10.5539/ijps.v3n2p186>
- Joy, S. & Kolb, D. A. (2009). Are there cultural differences in learning styles? *International Journal of Intercultural Relations*, 33(1), 69-85. <https://doi.org/10.1016/j.ijintrel.2008.11.002>
- Kharb, P., Samanta, P. P., Jindal, M., & Singh, V. (2013). The Learning Styles and the Preferred Teaching—Learning Strategies of First Year Medical Students. *Journal of Clinical and Diagnostic Research*, 7(6), 1089-1092. <https://doi.org/10.7860/JCDR/2013/5809.3090>
- Kopsovich, R. D. (2001). *A study of correlations between learning styles of students and their Mathematics scores on the Texas assessment of academic skills test* (Unpublished doctoral dissertation). University of North Texas, North Texas, US.
- Lee, J.-Y. (2011). English learning styles of East Asian Countries: A focus on reading strategies. *International Education Studies*, 4(2), 74-81. <https://doi.org/10.5539/ies.v4n2p75>
- Leite, W. L., Svinicki, M., & Shi, Y. (2010). Attempted Validation of the Scores of the VARK: Learning Styles Inventory With Multitrait-Multimethod Confirmatory Factor Analysis Models. *Educational and Psychological Measurement*, 70, 323-339 <https://doi.org/10.1177/0013164409344507>
- Li, Y., Chen, H., Yang, B., & Liu, C. (2010). An exploratory study of the relationship between age and learning styles among nursing students in different nursing programs in Taiwan'. *Nursing Education Today*, 31(1), 18-23. <https://doi.org/10.1016/j.nedt.2010.03.014>
- Lincoln, F., & Rademacher, B. (2006). 'Learning styles of ESL in community colleges. *Community Journal of Research and Practice*, 30(5), 485-500. <https://doi.org/10.1080/10668920500207965>.
- Mayer, R. E. (2009). Does styles research have useful implications for educational practice? *Learning and Individual Differences*, 21(3), 319-320. <https://doi.org/10.1016/j.lindif.2010.11.016>
- Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2009) Learning Styles: Concept and Evidence. *Psychological science in the Public Interest*, 9(3), 105-119. <https://doi.org/10.1111/j.1539-6053.2009.01038.x>
- Raddon, A. (2007). Distance learners juggling home, work, and study. In P, Cotterill., S, Jackson., & G, Letherby (Eds.), *Challenges and Negotiations for women in higher education* (pp. 159-181). Dordrecht: The Netherlands: Springer.
- Ramayah, M., Nasrijal, N. H., Leong, L. C., Sivanandan, P., & Letchumanan, T. (2011). Factors influencing the learning style preferences among business school students. *Journal of Advanced Social Research*, 1(2), 229-243.
- Rogowsky, B. A., Calhoun, B. M., & Tallal, P. (2015). 'Matching Learning Style to Instructional Method: Effects

- on comprehension? . *Journal of Educational Psychology*, 107(1), 64-78. <https://doi.org/10.1037/a0037478>
- Song, D., & Oh, E. (2011). Learning styles based on the different cultural backgrounds of the KFL learners in online learning. *Multi-media Assisted Language Learning*, 13(3), 133-154.
- Tatarintseva, A. (2002). The influence of the gender factor to the learning styles of secondary students in the process of language learning. *Studies About Languages*, 2, 63-68.
- Tōugu P. & Tulviste T. (2017). Links between children's language comprehension and expressive vocabulary and their personality traits: A longitudinal investigation. *Learning and Individual Differences*, 57, 123-128. <https://doi.org/10.1016/j.lindif.2017.03.015>
- Wehrwein, E., Lujan, H., & DiCarlo, S. (2007). Gender differences in learning style preferences among undergraduate physiology student. *Journal of Advances in Physiology Education*, 31, 153-175. <https://doi.org/10.1152/advan.00060.2006>

Appendix

VARK Survey for Younger People

Learning Style أساليب التعلم

This survey helps the learner find his or her own learning style, the style of studying that suits him or her best, so that learning becomes easier, faster and more fun. Choose the answer that best describes you.

Your Information معلومات شخصية

1. Your College الكلية
 - IT College كلية نظم المعلومات
 - Arts College كلية الآداب
 - College of Science كلية العلوم
 - College of Engineering كلية الهندسة
2. Age العمر
 - 16
 - 17
 - 18
 - 19
 - 20
 - 21
 - 22
 - 23
 - 24

3. Gender النوع

male ذكر

female أنثى

Your Preferences

Choose the answer which best explains your preference and click the box next to it. Please click more than one if a single answer does not match your perception. Leave blank any question that does not apply.

1. You are going to make something special for your family. You would هل ستقوم بعمل شيء مميز لعائلتك.
 - decide from pictures in magazines. ستقرر حسب صور تراها بالمجلات.

- find written instructions to make it. ستبحث عن تعليمات كتابية عن طريقة عمله.
- make something I have made before. ستقوم بشيء قمت به من قبل.
- talk it over with my friends. سأناقش الموضوع مع أصدقائي.

2. Remember when you learned how to play a new computer or board game. You learned best by عندما تعلمت لعبة كمبيوتر أو لعبة إلكترونية جديدة، هل تتعلم أفضل إذا

- listening to somebody explaining it and asking questions. استمعت لشخص ما وسألته عن التفاصيل.
- clues from the diagrams in the instructions. تابعت رسوم توضيحية في تعليمات اللعبة.
- reading the instructions. قرأت التعليمات كتابياً.
- watching others do it first. راقبت شخصاً يلعبها أولاً.

3. You need to give directions to go to a house nearby. You would tell them the directions. تريد أن ترشد شخصاً ما إلى منزل بالجوار. هل تقول لهم التعليمات للوصول إليه.

write down the directions as a list. تكتب التعليمات للوصول إليه.

walk with them. تسير معهم إلى ذلك المكان.

draw a map on a piece of paper or get a map online. ترسم خريطة على ورقة أو على خريطة.

4. You have a problem with your knee. Would you prefer that the doctor عندك مشكلة في ركبتك. هل تفضل طبيباً

- showed you a diagram of what was wrong. يريك صوراً توضيحية عن مشكلتك.
- demonstrated what was wrong using a model of a knee. يريده مجسماً للركبة لشرح مشكلة ركبتك.
- gave you an article or brochure that explained knee injuries. يعطيك منشوراً أو مقالاً أو كتيباً فيه تفاصيل حالتك.
- described to you what was wrong. يشرح لك شفوياً مشكلة ركبتك.

5. You have to present your ideas to your class. You would يتوجب عليك أن تطرح فكرتك على زملائك في الفصل. هل

- make diagrams or get graphs to help explain my ideas. ترسم مخططات للفكرة لتساعدك على شرح فكرتك.
- gather examples and stories to make it real and practical. تجمع أمثلة وقصص متعلقة بالموضوع لجعلها واقعية وعملية.
- write a few key words and say them again and again. تكتب بعض الكلمات الرئيسية المتعلقة بالموضوع وتكررها.
- write out my speech and learn it by reading it again and again. تكتب خطابك وتحفظها وتكررها عدة مرات لتتقنها.

6. Do you prefer a teacher who likes to use هل تفضل المدرس الذي

- an overview diagram, charts, labelled diagrams and maps. يستخدم صور توضيحية ورسوم بيانية وخرائط.
- class discussions, online discussion, online chat and guest speakers. يستخدم النقاش في الصف والنقاش أونلاين.
- a textbook and plenty of handouts. ويحضر ضيوفاً للمحاضرات للتحدث في مجالهم يستخدم الكتاب المدرسي والملازم.
- field trips, case studies, videos, labs and hands-on practical sessions. يستخدم الرحلات الميدانية والفيديوهات والتجارب العملية.

7. You are learning to take photos with your new digital camera or mobile phone. You would like to have أنت تتعلم التصوير بكاميراتك الرقمية الجديدة أو موبايلك الجديد. هل تفضل أن يكون لديك

- a chance to ask questions and talk about the camera's features. فرصة لطرح الأسئلة والحديث عن خصائص كاميرتك.
- examples of good and poor photos and how to improve them. أمثلة ونماذج لصور جيدة وأخرى سيئة للنظر في كيفية تحسينها.
- diagrams showing the camera and how to use it. استخداماها صور توضيحية عن الكاميرا وطريقة.
- clear written instructions with lists and bullet points. تعليمات كتابية وقوائم في شكل نقاط مرقمة.

8. You want some feedback about an event, competition or test. You would like to have feedback تحتاج تقييماً لفعالية أو مسابقة، هل تفضل أن يكون التقييم والتعليق

- that used examples of what I have done. يقدم أمثلة على ما قمت به.
- that used a written description or table of my results. يصف كتابياً أو يضع في جدول نتائجي.

- from somebody who discussed it with me. مباشرة من شخص يناقشني بالنتائج
- that used graphs showing what I achieved. مقدماً بصورة رسوم بيانية تصف ما أنجزته

9. A website has a video showing how to make a special graph. There is a person speaking, some lists and words describing what to do and some diagrams. You would learn most from هناك فيديو يريك كيف تعمل رسماً بيانياً خاصاً. هل تفضل

- listening. الاستماع لشرح شفوي عن طريقة استخدام البرنامج
- reading the words. قراءة الشرح كتابياً
- watching the actions. مشاهدة الخطوات على الكمبيوتر
- seeing the diagrams. مشاهدة صور توضيحية للخطوات

10. You have been selected as a tutor or a leader for a holiday program. This is interesting for your friends. You would تم اختيارك مرشداً في برنامج للعطلة الصيفية، هل

- describe the activities I will be doing in the program. ستشرح لأصحابك ما ستقومون به
- show them the map of where it will be held and diagrams about it. تقدم لهم خريطة عن الأماكن التي ستذهبون لها
- start practising the activities I will be doing in the program. تبدأ بالتدرب على الأنشطة التي ستقوم بها
- show them the list of activities in the program. ستكتب قائمة بالأنشطة التي ستقومون بها

11. You are about to hook up your parent's new computer. You would سوف تقوم بتركيب وتوصيل كمبيوتر جديد اشتراه والداك. هل

- follow the diagrams that show how it is done. تتبع الرسوم التخطيطية الإرشادية لكيفية عمل ذلك
- phone, text or email a friend and ask how to do it. تتصل أو تكتب رسائل نصية إلى صديق تسأل عن الطريقة
- read the instructions that came with it. تقرأ التعليمات المرفقة
- unpack the box and start putting the pieces together. تفتح العلبة وتبدأ بتركيب وتوصيل الكمبيوتر

12. You are about to buy a new digital camera or mobile phone. Other than price, what would most influence your decision? ستقوم بشراء كاميرا رقمية جديدة أو موبايل جديد. إلى جانب السعر، ما أهم ما سيؤثر على قرارك

- it is the latest design and looks good. أن يكون أحر موديل ويكون شكله جذاباً
- reading the details about its features. قراءتي للتفاصيل والخصائص
- trying it. تجربته قبل شرائه
- the salesperson telling me about it. ما سيقوله لي البائع عن الكاميرا

13. You want to plan a surprise party for a friend. أنت تخطط حفلة مفاجئة لصديقك. هل

- draw a map and make a special design for the invitation. ترسم خريطة وتعمل بطاقة دعوة ذات تصميم مميز
- talk about it on the phone or text others. تناقش باقي أصحاب على الهاتف أو بالرسائل النصية
- invite friends and just let it happen. تدعو أصدقاءك وتدع كل شيء يحدث بصورة طبيعية
- make lists of what to do and what to buy for the party. عملت قائمة من الأعمال التي يجي القيام بها والأشياء التي يجب شراؤها

14. A new movie has arrived in town. What would most influence your decision to go (or not go)? نزل فيلم جديد، ما الذي يؤثر في قرارك في مشاهدته أم عدم مشاهدته

- you see a preview of it. مشاهدة مقاطع إعلان عنه
- hear friends talking about it. ما يقوله أصحابي الذي شاهدوه
- it is similar to others you have liked. إذا كان من النوعية التي أعجبتني سابقاً
- you read what others say about it online or in a magazine. قراءة التقارير عنه أونلاين أو في المجلات

15. I like websites that have أحب الصفحات الإلكترونية التي لديها

- interesting design and visual effects. تصميم مميز ومؤثرات بصرية
- things I can click on and do. أشياء التفاعل مع صفحاتها والضغط على أشياء
- interesting information and articles in print. معلومات مثيرة للاهتمام ومقالات قابلة للطباعة
- audio channels for music, chat and discussion. تسجيلات صوتية وموسيقى ومنتديات

16. After reading a play you need to do a project. Would you prefer to عمل بعد أن قرأت نص مسرحية صار مطلوباً منك عمل مشروع عنه. هل تفضل

- أن تمثل مقطعاً من المسرحية? act out a scene from the play?
- تكتب تقريراً عن المسرحية? write about the play?
- ترسم لوحة أو تخطيطاً عن إحدى المشاهد? draw or sketch something that happened in the play?
- تقرأ خطاباً ورد في المسرحية? read a speech from the play?

Notes

Note 1. No access to exact number of students in each college in the specific semester when the survey took place could be obtained.

Note 2. Since each participant could choose more than one option per question, the total number of responses to each question could be more than the number of the participants. Hence, here we calculate the percentage of the responses to each question by each gender in comparison to the total number of responses received for each question by each gender. For example, the total responses collected to Q1 from male participants was 60, from females was 186. Since 'visual' was chosen eight times in response to Q1 by males and 53 times by females, this means that 13.2 per cent of the male responses to Q1 was 'visual' ($8/60 \times 100$), and 28.5 per cent of the female responses to the same question were 'visual' ($53/186 \times 100$).

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).