

## Predominant learning styles in Saudi preparatory schools

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**Abstract:** The study proposes to investigate the predominant learning style of Saudi students in grade 7 and 8. The sample of the study consists of 399 students from eight schools. The study used VARK questionnaire - younger version to determine student learning style. The quad learning style was the predominant learning style for both grade and gender. Tri and bi learning styles typically followed the quad style with a variation in order of preference between the reading achievement groups.

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### 1. Introduction

The relationship between learning styles and academic achievement in different level of education was examined by researchers. Nolting (2002) emphasized that students' academic achievement positively increases if they are aware of their learning style and how they learn best. A study which evaluated the relationship between learning style and students' academic achievement was conducted by Wallace (1992) the study aimed to evaluate the achievement of elementary school students who preferred learning alone or with peers. The student participants were introduced to a small group learning method and were given five lessons with the option of working alone or with peers each time. The result showed statistically significant differences between the two groups. Students who preferred to learn alone achieved significantly higher mean scores. Also Collinson (2000) found significant differences between academic achievement with three out of twenty two learning style elements on Dunn and Dunn inventory. The study concluded that low achievers prefer to learn in a formal classroom with peers during the afternoon, whereas high achievers preferred studying along with self-directed objectives.

Yazicilar and Guven (2009) conducted a study among fifth grade students in a social studies class to determine the relationship between learning style preference and academic achievement. A sample of 50 students participated in the study, divided into an experimental and a control group. The experimental group were those who received an educational included audio, visual and teaching practices materials, while the control group received educational using teacher centered and primary school program methods. The results showed significant differences between the experimental and control groups in terms of academic achievement and

retention. A study by Bahar (2009) used Grasha – Riechmann learning style scale. The study reported significant connection between learning style and performance in mini projects. In addition, students who belong to high achiever groups were independent, competitive and participative in nature, while those who had relatively lower achievement level were avoidant, dependent and learned best in collaborative groups.

Based on Kolb inventory Matthews (1996) conducted a study to evaluate the relationship between the academic achievement of high school students and learning styles.. The result showed a significant effect between learning styles and the ratings of students with regards to perceived academic achievement. The convergent style had a higher mean ( $M= 3.60$ ) on rating than accommodative, assimilative and divergent styles. High achievers tended to be convergers, while low achievers tended to be divergers. Students who attended mathematics and science groups in high school were the focus of research conducted by Ozkan (2003), who investigated the influence of learning style on academic achievement. The study noted that students who depend on an assimilative learning style to gather and use information were more successful than divergers, accommodators and convergers according to their academic achievement in biology tests.

Some studies were conducted to explore the learning styles of high and low academic achievement students. Hlawaty (2008) compared three academic achievement groups (low achievers, high achievers and gifted) and learning styles based on Dunn and Dunn learning style theory. The study reported that gifted students were less parent and teacher motivated while high and average students were more mobile, and low achievement students were more authority and teacher-oriented. Jackson- Allen and

Chirstenberry (1994) conducted a study to compare the learning style preferences of low achieving African – American male students with those who were high achieving. A t- test was conducted to examine the differences between low and high achieving auditory, visual, tactile, and kinaesthetic learning styles. The t-test results showed no statistically significant differences (p .05) between the two groups on auditory, visual, tactile, and kinaesthetic elements of learning styles whereas motivation, mobility and parent motivated. The post hoc analysis indicated that students in low achieving groups were less self motivated than high achieving groups, Furthermore, low achieving students needed a more active involvement in their learning experiences and they had less desire for academic achievement.

Park (1997) found significant differences among high achieving, middle achieving and low achieving students based on a Reid learning style questionnaire. Furthermore, he observed that students from high and middle achieving groups preferred an auditory learning style whilst the low achieving group had only a minor preference for auditory learning. For a visual learning style the high and middle achieving group had minor preferences whereas the low achieving group had a negative preference. The low achieving group preferred learning in a group style while the high achieving group had a negative preference for this style. The high achieving group had a major preference for an individual learning style; while the low achieving group had a negative preference for the individual learning style. He concluded that “high achievers appear to have multiple learning styles preferences” (p.106). Another study was conducted by Crosley (2007), to compare student achievement of those who attended traditional classrooms with those who attended multisensory classrooms. The result showed a positive and significant impact on achievement with students learning more and having a better attitude to learning when they were in the multisensory classroom.

The link between academic achievement of undergraduate students and learning styles was the subject of a study conducted by Jones *et al.* (2003). They found significant differences for overall GPA and learning styles. The students with highest GPA were assimilators while students who were lowest GPA tend to were the divergers. Study of Mckee (1995) showed a small, statistically significant relationship between learning styles preference and academic achievement. Furthermore, no relationship between learning style preferences and first term and fifth term academic achievement was found. Students who were not in good academic standing preferred reflective observation style more than students who were in good standing.

Kia *et al.* (2008) noted that “academic achievement of students with different learning styles is different” (p, 32). Kia *et al.* found high academic achievers have social, aural and solitary learning styles, while low achievers use logical and physical styles. Alkhasawneh *et al.*(2008) indicated that students with multimodal learning styles achieve higher than other.

In 2006, Abdulkadir and Din. used a Kolb inventory to evaluate the interaction between learning styles and academic achievement among secondary school students in Malaysia. The results did not show any significant differences between high and low achievement groups. Abdulkadir *et al.* justified this result because students in secondary schools are exposed to a limited variety of experiences in their learning process. Fox and Bartholomas (1999) reported the Kolb learning style inventory was unable to determine a significant relationship between learning style and academic achievement. The study was conducted among undergraduate students who were enrolled in four introductory family financial management courses. Same was showed by Roig (2008). The study also concluded that, no relationship existed between preferred learning styles and academic achievement.

Most of the studies indicated learning styles as the factor which has greatest effect on students’ academic achievement. However, researchers should be aware of other factors such as motivation to learn and age which may have more effect than learning styles. The current study was conducted to investigate the main preferences in learning styles of male and female grade seven and eight students, attending preparatory schools in Jeddah Saudi Arabia, who are either low or high in reading achievement

## 2. Method

### Sample

The population from which the sample for this study was drawn constitutes the 287 preparatory public schools of the Jeddah administrative area of Saudi Arabia. The Education Department of Jeddah divides the city into four regions: South, Central, East and North. One school for male students and one school for female student were randomly selected from each region as the sample in the study. Furthermore, Sixteen Arabic language teachers have been selected randomly from each school. One teacher in grade 7 and one in grade 8 with their students participated in this study. The total number of students in last phase in this study consist of 399.

### Measures

The Reading Achievement Assessment Form (RAAF), VARK, and student and teacher forms of the Teaching Reading Strategies Questionnaire (TRSQ)

are discussed in detail at chapter four. The following is a brief summary that outlines the value of the instruments used in this study.

#### **Reading Achievement Assessment Form (RAAF).**

The RAAF designed by the researchers to evaluate student in grade 7 and 8 in the five reading skill: comprehension, fluency, understanding tense, vocabulary and reading summary. RAAF used the following assessment categories; Excellent (5), V. Good (4), Good (3), Satisfactory (2) and Weak (1) (Appendix B).

#### **VARK questionnaire - the younger version.**

Students in grade 7 and 8 completed VARK questionnaires. The questionnaire was designed by Neil Fleming in 1995. It consists of 16 questions. The researchers translated the questionnaire to the mother language of Saudi students (Arabic). Student need less than 25 minutes to complete VARK questionnaires.

#### **Procedure of Data Collection**

The Arabic reading teachers' evaluated 602 students in five reading skill areas in the first phase used RAAF. Teachers also asked to provide the first term (FT) exam scores for their students in Arabic reading. On the basis of the students' results for the RAAF and FT, only the upper and the lower 33 per cent of students of the sample of 602 were selected for the next phase of this study. A total cohort of 399 students from eight schools participated in last phase and responded the VARK questionnaire.

#### **Data analysis**

Table shows the frequency and percentage results for the single and multimodal learning style

The data derived from the VARK was categorised using two different methods. Firstly, students were classified according to their learning styles into two groups, multimodal style (M) and single style (S). The multimodal style group consisted of students who used more than one style to learn, whereas the single style category consisted of students who depended only on one style. The second classification method, labelled as VARK7G, categorised students into seven learning style groups that consisted of visual, aural, read/write, kinaesthetic, bi, tri and quad styles. The data were then statistically analysed to address the six research questions posed at the above of this chapter. Descriptive statistics including frequencies and percentages were calculated, and chi-square analyses completed to determine the relationships between the main preferences in learning styles of male and female grade seven and eight students, who were either low or high in reading achievement.

### **3. Result**

Participants' were grouped according to their gender, grade level and reading achievement scores as the classification basis for the investigation of their preferred learning styles. The frequencies and percentages of students' learning styles preferences in the low and high reading achievement categories were calculated for each of the genders and class levels.

preferences of grade 7 male (G7M) students with low and high reading achievement.

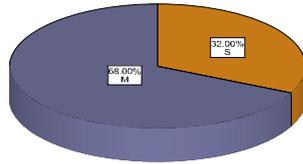
**Table 1: Multimodal and Single Learning Style Preference Frequencies and Percentages for G 7 M Students High or Low in Reading Achievement**

		S	M	Total
Low Reading Achievement	f	16	34	50
	%	32	68	100
High Reading Achievement	f	10	40	50
	%	20	80	100
Total	f	26	74	100
	%	26	74	100
Abbreviation Note: S = Single style; M = Multimodal style				

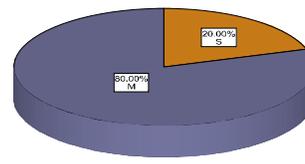
The majority of students in both the low and high reading achievement groups preferred a multimodal learning style (see Figure ). The high reading achievement group demonstrated the strongest preference for the multimodal learning style. However, chi-square results indicated there were no significant association in the percentages of low and high reading achievement students who preferred multimodal or single learning styles of information,  $\chi^2(1, N = 100) = 1.87, p = .13$ . The association was small  $\phi = .111$  and therefore the students preferred learning style accounted for 1.2 % of variance in the reading achievement.

Table 1 shows the percentages and frequencies of grade 7 male students with a high or low reading achievement according to their VARK 7G learning styles categories. Grade 7 male students distributed differently in both reading achievement groups.

Low reading achievement G 7 M



High reading achievement G 7 M



**Figure 1. Percentages of multimodal and single learning styles for G 7 M students high or low reading achievement.** Abbreviations Note: G 7 M = Grade Seven Male

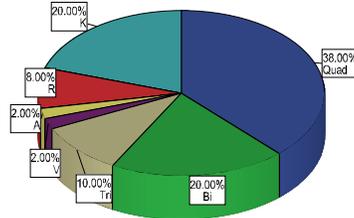
**Table 1. VARK7G Preference Frequencies and Percentages for G 7 M Students High or Low in Reading Achievement.**

			Quad	Tri	Bi	V	A	R	K	Total
Low achievement	Reading	f	19	5	10	1	1	4	10	50
		%	38	10	20	2	2	8	20	100
High achievement	Reading	f	23	13	4	5	1	2	2	50
		%	46	26	8	10	2	4	4	100
Total		f	42	18	14	6	2	6	12	100
		%	42	18	14	6	2	6	12	100

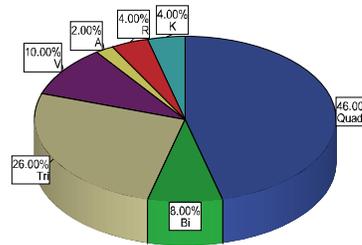
Abbreviations Note: Quad = quad style; Tri = tri style; Bi = bi style; V = visual; A = aural; R = read/write, K = kinaesthetic

**Error! Reference source not found.** demonstrates that quad style was the preferred learning style in both groups of reading achievement, with a higher percentage of the students preferring these styles in the high reading achievement group. The percentage of tri learning styles was larger for the high reading achievement group whereas the percentage of the bi learning style in the low group was larger than in the high group. The same percentage was recorded in both groups for the aural learning style. The kinaesthetic learning style in the low group demonstrated the highest single style percentage and was much greater than that found in the high group. In addition, the visual learning style was substantially greater in the high reading achievement group. There were significant chi square association in the percentage of low and high reading achievement students who preferred the quad, tri, bi, V, A, R, K styles of information,  $\chi^2(6, N = 100) = 15.17, p = .02$ . The association was of small strength:  $\phi = .352$  and therefore the students preferred learning style accounted for 12.3 % of variance in the reading achievement scores.

L reading achievement G 7 M



H reading achievement G 7 M



Abbreviations Note: Quad = quad style; Tri = tri style; Bi = bi style; V = visual; A = aural; R = read/write, K = kinaesthetic

**Figure 2. Percentages of VARK7G learning styles for G 7 M students high or low reading achievement**

Table presents the percentages and frequency of multimodal and single learning styles among female students in grade 7(G 7 F) with low or high reading achievement.

**Table 3. Multimodal and Single Learning Style Preference Frequencies and Percentages for G 7 F Students High or Low in Reading Achievement.**

		S	M	Total
Low Reading Achievement	f	18	33	51
	%	35	65	100
High Reading Achievement	f	24	28	52
	%	46	54	100
Total	f	42	61	103
	%	40	60	100

Abbreviation Note: S = Single style; M = Multimodal style

Figure shows the percentages of the multimodal and single learning styles for grade 7 female students. The percentage of multimodal learning styles was larger in the low reading achievement group. Only small differences were found between the single and multimodal learning styles in the high group. In general there were no significant association between the reading achievement groups in the percentages of students who preferred a multimodal and single style,  $\chi^2(1, N = 103) = 1.26, p = .26$ . The association was  $\phi = .110$  and therefore the students preferred learning style accounted for 1.2 % of variance in the reading achievement.

L reading achievement G 7 F

H reading achievement G 7 F



Abbreviation Note: S = Single style; M = Multimodal style

**Figure 3. Percentages of multimodal and single learning styles for G 7 F students high or low reading achievement.**

The frequencies and percentages of the grade 7 female students' shows different distribution between reading achievement groups according to their VARK 7 style preferences.

Table shows the frequencies and percentages in the seven learning style subgroups for grade 7 female students categorised low or high in reading achievement.

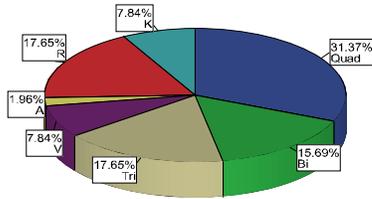
**Table 4 VARK7G Preference Frequencies and Percentages for G 7 F Students High or Low in Reading Achievement**

		Quad	Tri	Bi	V	A	R	K	Total
Low Reading achievement	f	16	9	8	4	1	9	4	51
	%	31	18	16	8	2	18	8	100
High Reading achievement	f	14	2	12	4	3	5	12	52
	%	27	4	23	8	6	9	23	100
Total	f	30	11	20	8	4	14	16	103
	%	29	11	19	8	4	14	15	100

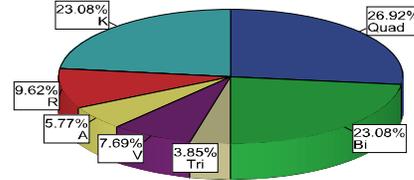
Abbreviations Note: Quad = quad style; Tri = tri style; Bi = bi style; V = visual; A = aural; R = read/write, K = kinaesthetic

Figure shows the learning style percentages of low and high reading achievement grade 7 female students. Each reading achievement group has own distributed on VARK7G categories.

L reading achievement G 7 F



H reading achievement G 7 F



Abbreviations Note: Quad = quad style; Tri = tri style; Bi = bi style; V = visual; A = aural; R = read/write, K = kinaesthetic

**Figure 4. Percentages of VARK7G learning styles for G7F students high or low reading achievement.**

Those with a quad learning style are a large percentage in both groups of reading achievement. In addition, the percentage of those using a tri learning style in the low group is substantially higher than in the high group. In the high achievement group however the percentage of students who have a bi learning style preference is large. In relation to the single modes of learning styles the students in the high group demonstrated a clear preference for the Kinaesthetic learning style while low group students preferred the read/write learning style. However, overall there were no significant association in the percentages of low and high students who preferred quad, tri, bi, V, A, R, or K styles of information,  $\chi^2(6, N = 103) = 11.522, p = .07$ . The association was  $\phi = .334$  and therefore the students preferred learning style accounted for 11.1 % of variance in the reading achievement.

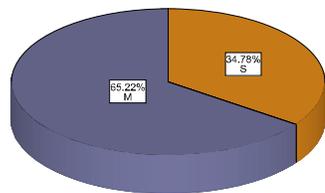
**Table 5 Multimodal and Single Learning Style Preference Frequencies and Percentages for G 8 M Students High or Low in Reading Achievement**

		S	M	Total
Low Reading achievement	f	16	30	46
	%	35	65	100
High Reading achievement	f	10	36	46
	%	22	78	100
Total	f	26	66	92
	%	28	72	100

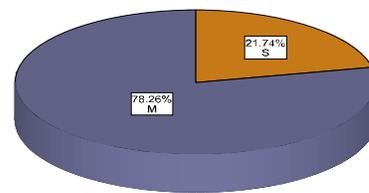
Abbreviation Note: S = Single style; M = Multimodal style

Table presents the frequency of male students in grade 8 with low or high reading achievement groups. In grade 8 male students the results draw attention to percentage differences between the two achievement groups reading in multimodal or single learning styles methods.

L reading achievement G 8 M



H reading achievement G 8 M



Abbreviation Note: S = Single style; M = Multimodal style

**Figure 5. Percentages of multimodal and single learning styles for G 8 M students high or low reading achievement**

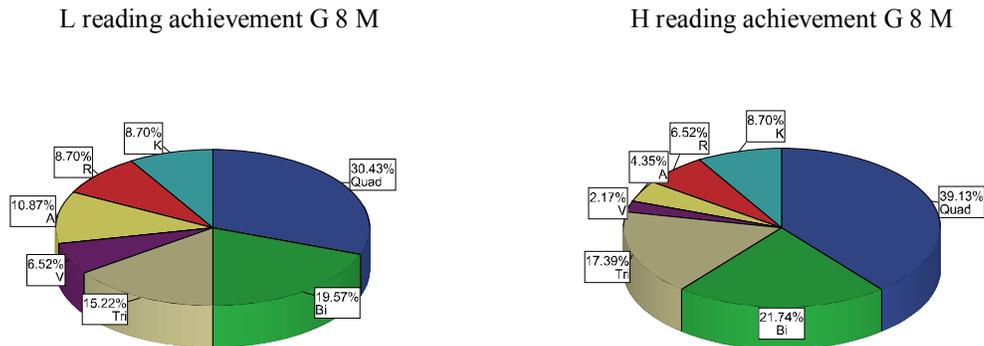
Figure presents the percentage contrasts for the multimodal and single learning styles of grade 8 male students. The majority of students in both groups of grade 8 male students preferred multimodal learning styles with a marginally higher percentage of students found in the high reading achievement group. There were no significant chi square association in the percentage of students with high or low reading achievement who preferred the multimodal or single learning styles,  $\chi^2(1, N = 92) = 1.930, p = .16$ . The association was  $\phi = .145$  and therefore the students preferred learning style accounted for 2.1 % of variance in the reading achievement.

**Table 6 VARK7G Preference Frequencies and Percentages for G 8 M Students High or Low in Reading Achievement**

		Quad	Tri	Bi	V	A	R	K	Total
Low Reading achievement	f	14	7	9	3	5	4	4	46
	%	30	15	20	6	11	9	9	100
High Reading achievement	f	18	8	10	1	2	3	4	46
	%	39	17	22	2	4	7	9	100
Total	f	32	15	19	4	7	7	8	92
	%	35	16	21	5	7	7	9	100

Abbreviations Note: Quad = quad style; Tri = tri style; Bi = bi style; V = visual; A = aural; R = read/write, K = kinaesthetic

Further investigation into differences between high and low reading achievement groups within grade 8 male students was achieved by examining the VARK 7 groups. Table shows the frequency and percentage of learning preferences between the two reading achievement groups in the grade 8 male students.



Abbreviations Note: Quad = quad style; Tri = tri style; Bi = bi style; V = visual; A = aural; R = read/write, K = kinaesthetic

**Figure 6. Percentages of VARK7G learning styles for G 8 M students high or low reading achievement.**

**Error! Reference source not found.** shows the learning style percentages of low and high reading achievement grade 8 students. A quad learning style is considered as a common style amongst grade 8 males students overall. Students who preferred quad learning style in the high group were larger in number than students in the low group. A bi learning style was the second most frequent learning style among male grade 8 students followed by the tri style. The percentage of students who preferred bi and tri learning styles in the high group was greater than the percentage of students in the low group. A kinaesthetic learning style had a similar percentage in both groups, whereas, the percentage of visual, aural and read/write learning styles in the low group was higher than the percentage of similar learning styles in the high group. Overall however, there were no significant association in the percentages of low and high students who preferred quad, tri, bi, V, A, R, or K styles of information,  $\chi^2(6, N =$

92) = 3.048,  $p = .80$ . The association was  $\phi = .182$  and therefore the students preferred learning style accounted for 3.3 % of variance in the reading achievement.

**Error! Not a valid bookmark self-reference.** shows the frequency and percentage between single and multimodal learning styles preferences of female students in grade 8 (G 8 F) with low or high reading achievement. Figure shows the percentage differences in singles and multimodal learning styles methods between the two grades 8 female reading achievement groups.

**Table 7: Multimodal and Single Learning Style Preference Frequencies and Percentages for G 8 F Students and High and Low Groups**

		S	M	Total
Low Reading Achievement	f	20	32	52
	%	38	62	100
High Reading Achievement	f	19	33	52
	%	37	63	100
Total	f	39	65	104
	%	37.5	63.5	100

Abbreviation Note: S = Single style; M = Multimodal style

L reading achievement G 8 F

H reading achievement G 8 F



Abbreviation Note: S = Single style; M = Multimodal style

**Figure 7. Percentages of multimodal and single learning styles for G 8 F students high or low reading achievement**

In general, Figure indicated that the percentage of multimodal and single learning styles preferences has a convergent number in both reading achievement groups. There were no significant chi square association between students in the high and low reading achievement groups who preferred a multimodal or single learning style  $\chi^2(1, N = 104) = .041, p = .83$ . The association was  $\phi = .020$  and therefore the students preferred learning style accounted for 0.04 % of variance in the reading achievement.

**Table 8 VARK7G Preference Frequencies and Percentages for G 8 F Students and High and Low Groups**

		Q	Tri	Bi	V	A	R	K	Total
Low Reading achievement	f	12	10	10	6	2	4	8	52
	%	23	19	19	12	4	8	15	100
High Reading achievement	f	13	7	13	4	5	5	5	52
	%	25	13.5	25	7.7	9.6	9.6	9.6	100
Total	f	25	17	23	10	7	9	13	104
	%	24	16	22	10	7	9	12	100

Abbreviations Note: Quad = quad style; Tri = tri style; Bi = bi style; V = visual; A = aural; R = read/write, K = kinaesthetic

Table presents the distributions by frequency and percentage of female Grade 8 students in the VARK 7 groups. The majority of students in both reading groups preferred the multimodal learning style.

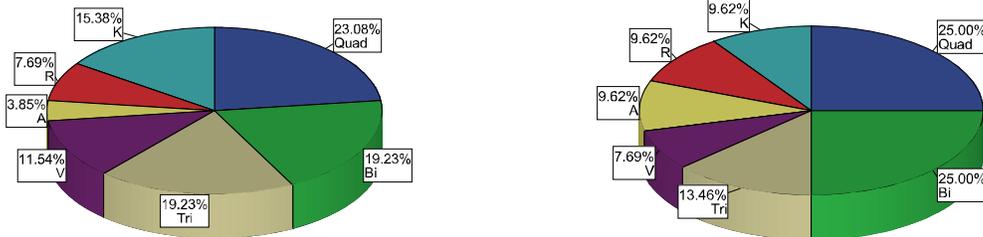
**L reading achievement G 8 F**

**H reading achievement G 8 F**

shows the majority of students in both reading groups preferred the multimodal learning style. The percentage of students in the high reading achievement group who preferred a quad or bi learning style was equal, as was the percentage of students in the low reading achievement group who preferred bi or tri learning style. However, the percentage of those who preferred a kinaesthetic learning style in the low group was nearly double that of those who preferred kinaesthetic style in the high group. Furthermore, the percentage of aural and read/write learning styles in the high group was larger than in the low group. The percentage of visual learning style was greater in the low reading achievement group. Overall, there were no significant association in the percentages of low and high reading achievements students who preferred quad, tri, bi, V, A, R, or K styles of information  $\chi^2(6, N = 104) = 3.450, p = .75$ . The association was  $\phi = .182$  and therefore the students preferred learning style accounted for 1.6 % of variance in the reading achievement.

**L reading achievement G 8 F**

**H reading achievement G 8 F**



Abbreviations Note: Quad = quad style; Tri = tri style; Bi = bi style; V = visual; A = aural; R = read/write, K = kinaesthetic

**Figure 8. Percentages of VARK7G learning styles for G 8 F students high or low reading achievement**

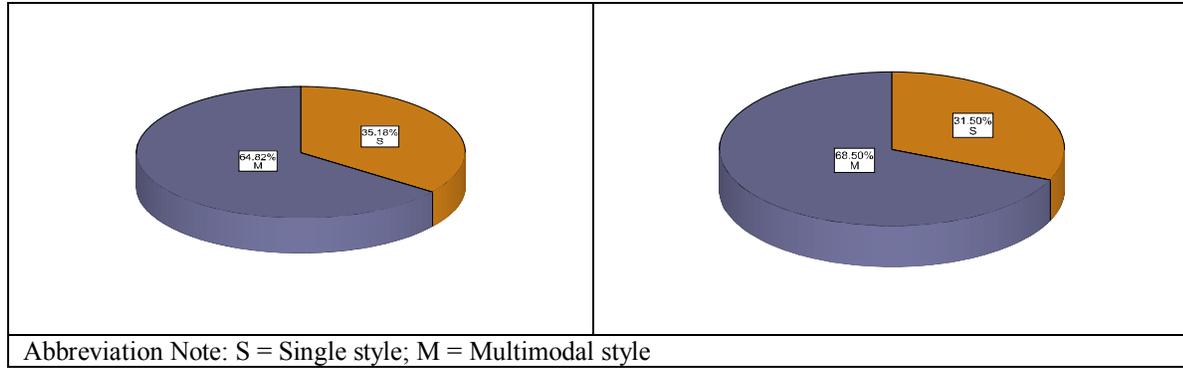
**Table 9 Multimodal and Single Learning Style Preference Frequencies and Percentages for All Students and High and Low Groups**

		S	M	Total
Low Reading achievement	f	70	129	199
	%	35	65	100
High Reading achievement	f	63	137	200
	%	32	68	100
Total	f	133	266	399
	%	33	67	100

Abbreviation Note: S = Single style; M = Multimodal style

For all participants, in grades 7 and 8 the results show the percentage differences between the two reading achievement groups in multimodal or single learning styles preferences. Table shows the frequency and percentage of all students in the low or high reading achievement groups. Multimodal learning styles was the preferred styles for large percentage of students.

L reading achievement	H reading achievement
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Abbreviation Note: S = Single style; M = Multimodal style  
**Figure 9. Percentages of multimodal and single learning styles for students high or low reading achievement.**

L reading achievement	H reading achievement
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indicates the majority of the total number of participants in both the low and high reading achievement groups preferred multimodal learning style, while, approximately one third of students preferred a single learning style. There were no significant association between high and low reading achievement groups who preferred a multimodal or single learning style  $\chi^2(1, N = 399) = .607, p = .43$ . The association was  $\phi = .039$  and therefore the students preferred learning style accounted for 0.1% of variance in the reading achievement.

**Table 10 VARK7G Preference Frequencies and Percentages for All Students and High and Low Groups**

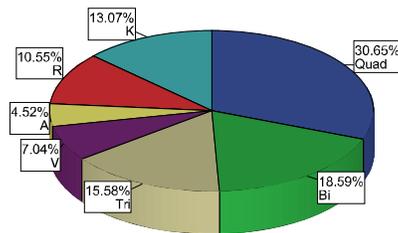
		Q	Tri	Bi	V	A	R	K	Total
Low Reading achievement	f	61	31	37	14	9	21	26	199
	%	31	16	19	7	4	10	13	100
High Reading achievement	f	68	30	39	14	11	15	23	200
	%	34	15	19	7	5	8	12	100
Total	f	129	61	76	28	20	36	49	399
	%	32	15	19	7	6	9	12	100

Abbreviations Note: Quad = quad style; Tri = tri style; Bi = bi style; V = visual; A = aural; R = read/write

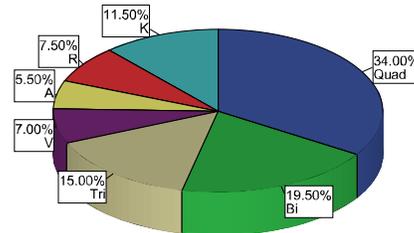
The frequency and percentage for all students with low or high reading achievement in the seven learning style subgroups shows in

Table . This table shows the distribution of participants in low and high reading achievement groups across the VARK 7 groups.

L reading achievement all student



H reading achievement all student



Abbreviations Note: Quad = quad style; Tri = tri style; Bi = bi style; V = visual; A = aural; R = read/write, K = kinaesthetic

### Figure 10. Percentages of VARK7G learning styles for students high or low reading achievement

Figure shows that the quad learning style is preferred by a large percentage in both groups. There are no large differences in percentage between the reading achievement group in bi and tri learning styles performance. The kinaesthetic learning style has a larger percentage in the low group compared with the high group. In addition, the percentage of students who preferred read/write learning style in the low group was greater. The percentage of those with a visual learning style in both groups was a similar, and there was little difference between the percentages of students who preferred an aural learning style in both groups. overall, there were no significant association between students in the high and low reading achievement groups who preferred quad, tri, bi, V, A, R, or K styles of information  $\chi^2(6, N = 399) = .1830$ ,  $p = .93$ . The association was  $\phi = .068$  and therefore the students preferred learning style accounted for 0.4 % of variance in the reading achievement.

#### 4. Discussion

Descriptive statistics, including frequencies, percentages and chi square comparisons between high and low groups were determined to address research question. The multimodal and single VARK group comparison showed that the multimodal learning style was preferred by both the low and high reading achievers in the sample. This indicates that the majority of students in this study demonstrate a preference to use more than one style when they learn. This pattern was clearer in the VARK7G results which showed the quad, tri and bi styles were the preferred styles for both reading achievement groups. The results indicated that the quad learning style was the prevailing style for both reading groups. The aural style was the least preferred style for both reading groups.

The current finding regarding the students' preference for multimodal learning is consistent with previous research (e.g., Ricca, 1984; Reese & Dunn, 2008). It is important to note, however, that these studies did incorporate different learning styles measures. Ricca (1984) used Dunns' theory as the basis for the evaluation of the learning style characteristics of high and low academic achievers. She found that both gifted and general program students used more than one style. The groups demonstrated preference for mixed learning styles that included the visual, auditory and mobility sub-factor learning styles. Reese *et al.* (2008) also found that high and low GPA achievers preferred more than one style to absorb the information. Reese *et al.* also noted low GPAs achievers preferred an environment with

bright light, sound or conversation. This suggests that the visual and aural learning style may be a useful way to teach low achievers. Hlawaty (2008) used Dunn's inventory and reported that high and average academic achievement students preferred mobility sub-factor, while low academic achievement students need authority and teacher-oriented learning sub-factor. Jackson-Allen *et al.* (1994) also investigated learning styles preferences using Dunns' inventory. They found low achievers in core academic courses (English, science, history and math) demonstrated lower scores on the motivation sub-factor and higher scores on the mobility sub-factor compared to high achievers in core academic courses who were strongly motivated. In addition, Park (1997) used the Reid questionnaire and determined the main learning styles for high and low academic achievement. He found that high and low achievers have similar multimodal learning styles preferences for sensory learning styles that included auditory, visual, kinaesthetic and tactile. Kia *et al.* (2009) used the memletics learning style inventory. They found that social, aural and solitary learning styles were common between students in the high academic achievement group and, logical and physical styles common in the low achievement group. The results found in the current study showed students in both groups, high and low, preferred more than one learning style. This finding when considered in relation to previous research implies students typically use a variety of the possible learning styles to facilitate the absorption of information.

Findings of this study revealed the kinaesthetic style was the preferred style for the low reading achievement group within the grade seven male and grade eight female samples. This result is consistent with the findings of Jackson-Allen *et al.* (1994), Littin (2002), Reese *et al.* (2008), Kia *et al.* (2009) and Williams (2010), whereby the typical pattern was that most low reading achievers tended towards the kinaesthetic style. The kinaesthetic style is considered to be an important feature in teaching students of preparatory school age, therefore this style should constitute a key component of programs working towards developing the skills of lower achieving students.

The chi square results revealed a significant relationship between high and low reading achievement and learning style preference in the grade 7 male group. This pattern of results is consistent with other researchers who compared educational achievement characteristics and learning style (Collinson, 2000; Kia *et al.*, 2009; Matthews, 1996; Park, 1997; Reese *et al.*, 2008; Ricca, 1984). They found significant differences between learning styles

and the student groups according to their academic achievement. Students in the high group demonstrated a preference for multimodal style (quad, tri and bi) followed by the visual style as the single style preference. Kinaesthetic and read/write were the preferred styles of the low group, who typically have a lesser tendency to incorporate the visual learning style. Reading in Saudi school is typically provided in the visual domain (textbook with picture). Interestingly, the preference for the quad and tri learning styles, which both include the visual learning style, of the grade seven high reading achievement group may explain their better scores on the reading skills measures. This is consistent with the finding of Kia *et al.* (2009), who reported that the visual learning style was the preferred styles for high academic achievers.

Chi square results revealed only one significant comparison between the preferred learning styles of the high and low reading achievement groups and subgroups (i.e., grade 7 males). The current results are consistent with those of Jackson- Allen *et al.* (1994) who found no significant differences in the auditory, visual, tactile, and kinaesthetic learning styles preferences between students categorised as low or high academic achievers. In addition, the results which were reported by Abdulkadir *et al.* (2006) highlighted no significant differences in the learning style preferences of students grouped as high and low according to their scores on the Malaysian public education examination. Fox *et al.* (1999) also found no significant differences between the academic achievement scores of undergraduate students and their learning styles as assessed using the Kolb questionnaire. Roig (2008) found there were no significant differences between the academic achievement scores of biology students grouped according to their learning styles on the Felder – Soloman learning styles inventory. Furthermore, Roig's (2008) reported the students preferred the sensing, visual and sequential learning styles. The current results clearly demonstrated that the quad learning style was the predominant learning style for both grade and gender. Tri and bi learning styles typically followed the quad style with a variation in order of preference between the reading achievement groups. However, overall on the basis of the current findings and similar learning styles research it could be surmised that learning styles is not a characteristic that could be used to differentiate between low and high achieving students in reading, or indeed in other areas of academic achievement.

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