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The relationship between Kolb's learning styles and students' GPA: A comparative study between student teachers and physical therapy students at Princess Nourah bint Abdulrahman University

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Abstract

The current study aimed to investigate Saudi female student teachers' preferred learning styles at Princess Nourah bint Abdulrahman University according to Kolb's theory and to compare them with female Saudi students from the physical therapy major and its relation to GPA scores. The purpose of the comparison was to find out whether or not students within different disciplines have adopted different learning styles. No research has been done that investigated Saudi female student teachers and physical therapy students. One hundred seventy students responded to the Learning Style Inventory (LSI) developed by Kolb (1999a). Descriptive analysis was used to answer the research questions. The divergent learning style was the preferred learning style among student teachers ($M= 6.38, SD=1.75$). Whereas Physical therapy students scored high as accommodators ($M=7.58, SD=1.74$). The study concluded that the significant association found between learning styles and students' GPA could act as a predictor of students' success. However, more research on different domains is required to understand the influence of learning styles on students' learning in order to develop the curriculum and activate the differentiation in teaching to fit with the different learning styles in different specializations.

Keywords: student teachers, learning styles, Kolb learning styles inventory, teaching strategies.

العلاقة بين انماط التعلم وفق نظرية كولب والتحصيل الجامعي: دراسة مقارنة بين عينة من الطالبات الملمات في كلية التربية وطالبات العلاج الطبيعي في جامعة الاميرة نورة بنت عبد الرحمن

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كلية التربية

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مستخلص البحث

هدفت الدراسة الحالية الى التعرف على انماط التعلم وفق نظرية كولب لدى الطالبات الملمات في السنة الثالثة في كلية التربية بجامعة الاميرة نورة بنت عبد الرحمن وعلاقتها بالمعدل الجامعي. كما هدفت الدراسة الى مقارنة انماط تعلم الطالبات الملمات بطالبات من نفس المستوى تخصص علاج طبيعي في كلية الصحة وعلوم التأهيل. تهدف المقارنة للتعرف على ما إذا كان اختلاف التخصص يحفز نمط محدد من انماط التعلم. تكونت عينة الدراسة من (170) طالبة من كلا المجموعتين. استخدمت الباحثة استبانة انماط التعلم لكولب (Learning Styles Inventory, version 3, 1999a) لمعرفة انماط تعلم الطالبات في كلا المجموعتين. استخدمت الدراسة المنهج الوصفي ومعامل الارتباط وتحليل التباين للإجابة على اسئلة الدراسة، اشارت النتائج الى ان الطالبات الملمات يفضلن النمط التباعدي في التعلم بمتوسط 6.38 بينما كان النمط التكفي هو النمط المفضل لدى طالبات العلاج الطبيعي بمتوسط 7.58. وقد خلصت الدراسة الى الحاجة الى اعداد دراسات على عينات أكبر من تخصصات مختلفة في جامعة الاميرة نورة بنت عبد الرحمن لتطوير المناهج وتفعيل التمايز في التدريس ليناسب انماط التعلم المختلفة في التخصصات المختلفة.

الكلمات المفتاحية: انماط التعلم، الطالبات الملمات، استبانة انماط التعلم لكولب.

Introduction

Not all learners are alike. Students are different in how they receive and process information (Tulbure, 2011). These differences are referred to as learning styles. Learning styles are defined as “those general characteristics of intellectual functioning (and personality type, as well) that pertain to you as an individual, and that differentiate you from someone else” (Cohen, 2004, p. 250). They considered one of the most important factors in students' learning as they influence students' understanding, motivation, and even proven to be related to students' self-esteem (Zhang & Sternberg, 2000; Sherry, 2003). A large body of research has shown the relationship between learning styles and students' achievement (e.g., Brittan-Powell, Legum & Taylor, 2008; Busato, Prins, Elshout, & Hamaker, 2000; Cheng & Chau, 2016; Cheng & Chau Farsides & Woodfield, 2003; Ferguson, James & Madeley, 2002; Hoffmann, Stover, Uriel & Liporace Et al, 2015; Kolb, 1984). These studies have shown that matching teaching styles with students' individual differences will enhance learning. On the same note, considerable studies have also shown that a mismatch between students' learning styles and teaching practices can have a negative impact on students' academic achievement (Naimie, 2010). Furthermore, these studies have illustrated how students can adopt specific intellectual traits that may become habits of learning for incorporating and interpreting information and consequently, successful learning occurs when teaching accommodates such differences (e.g., Dunn & Dunn, 1993; Gakhar, 2006; Grasha, 1996; Pooja & Singh, 2015).

Research studies connecting learning styles with achievement in different subjects do not have general consent on their relation (Peker, 2009). For example, in a study conducted by Peker (2009) found that students learning styles were a good predictor for their math academic achievement. Hadfield and Maddux (1988) however, found no relationship between the two variables in predicting students' success in math subject. Other studies on learning styles measured the relationship between learning styles and subject related anxiety. For example, Hadfield and Maddux (1988) found that field

independent learners have more math anxiety than field dependent students did. In addition, great deal of research studies used learning styles as a factor predicting choice of profession and students' GPA. In a study conducted using Kolb (1999a) learning styles inventory to investigate freshmen engineers students learning styles reported that Convergers who prefer abstract conceptualization and active experimentation had higher GPA than students with diverging learning styles that focuses on concrete experience and reflective observation(Hargrove, Wheatland, Ding, & Brown, 2008).

In teacher education programs, curriculum design and teaching practices aim to develop knowledgeable and skillful teachers who have the ability and the dispositions to be effective and caring teachers. One of the most important skills the programsstrive to instill in their candidates is the knowledge about themselves as well as their students' learning styles.Student teachers' learning styles have received recent attention because student teachers' learning styles were developed during college and may affect their future teaching approaches (Kablan & Kaya, 2013). It has been emphasized that student teachers should explore their own experiences and should reflect on their own learning while experiencing teaching. Peker & Mirasyedioglu (2008) explained that: teachers

“Must be able to reflect on and view these experiences from many perspectives for reflective observation. They must be able to create concepts that integrate their observations into logically soundtheories for abstract conceptualization. They must be able to use these theories to make decisions and solve problems” (Peker & Mirasyedioglu, 2008, p. 22).

Recent research related to learning styles and teacher education, argues that teacher educators should prepare pre-service teachers with the knowledge and the skills to design curriculum and activities that match students' diverse needs (Honigsfeld & Schiering, 2004). Knowledge about their own learning styles as well as helping student teachers understand how learning styles can influence their instructional decisions regarding

curriculum choices and pedagogical practices (Boyatzis & Mainemelis, 2000; Farrah & Lumpur, 2015; Honigsfeld & Schiering, 2004; Kablan & Kaya, 2013; Klein, 2003).

An overview of Kolb's Learning Style Theory

Kolb's research on learning styles adopted two approaches: The first defines students' learning styles as cognitive style that connects cognition to personality. The second focuses on the process and the strategies used to transform the new information (Hoffmann, Stover, Uriel, & María, 2015).

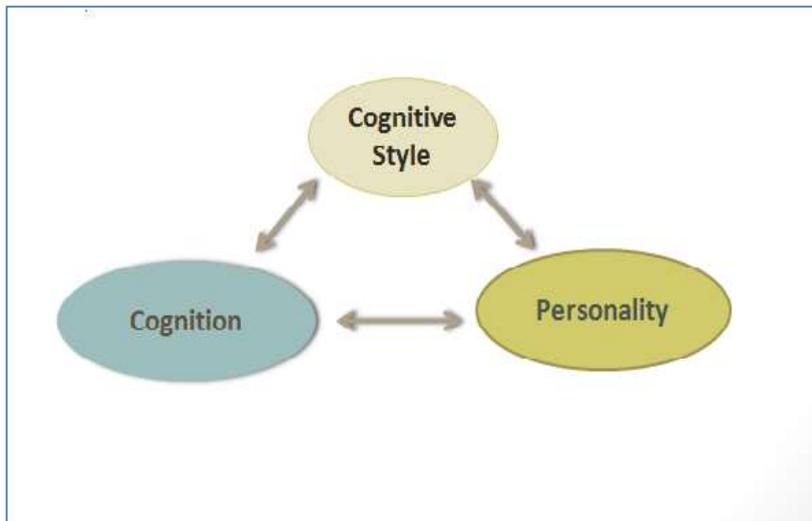


Figure 1: Cognitive learning styles

Cognitive learning styles (*figure 1*) hinge on a link between personality and cognition (Brown, 2000). It focuses on the learning environment such as visual, editorial, and kinesthetic. They “describe personal preferences in a learning environment.” (Kablan & Kaya, 2013, p. 67). For instance, cognitive learning styles divide students' learning preferences into four types: left and right brain functioning, field independence vs. field dependence, visual vs. verbal, and sensory vs. intuitive learners. A left hemisphere type learner is associated with logical and

analytical thoughts and feels comfortable with mathematical and linear processing of information. Whereas, the right hemisphere type of learner perceives visual and auditory types of information. This type of preference is associated with the holistic processing approach, and the learner feels more comfortable with emotional information. The second type of learners is field independent learners who are able to perceive parts from a whole (i.e. they see only parts but not their relationship to the whole). This type likes to work independently from others and prefers an analytical way of thinking. Whereas, field dependent learners are able to perceive the whole picture (i.e. they always tend to have a general or a larger view), and they like to work cooperatively with others. Third types of learners are the visual learners who prefer information presented visually with pictures, charts and diagrams, whereas verbal learners prefer oral explanation and written explanation. The last classification of cognitive learning styles is the sensory learners who prefer facts, data, and detail as oppose to intuitive learners who prefer imagination and don't like details (Brown, 2000).

The second types of learning styles studies investigated students' learning styles as perception and process. One of the well-known theories that studied learning styles as a process is the theory of Experiential Learning Style (ELS) developed by Kolb in 1984. The experiential learning theory argues that learning occurs when students utilize two processes: perception (grasping) of the experiences and the process of reflection on those new experiences (Healey & Jenkins, 2000). According to Kolb, these two approaches are translated into four learning cycles: concrete experience (CE), abstract conceptualization (AC), reflective observation (RO), and active experience (AE). The process, as Cavanagh, Hogan, & Ramgopal (1995) phrased it, starts with perceiving the concrete experience "followed by observation and reflection which lead to formation of abstract concepts and generalizations, resulting in hypotheses which will be tested by future actions learning to new experiences" (Cavanagh et al., 1995, p. 177-178). Kolb (1984) argued that how students' responses to experiences defines their

learning preferences. Kolb explained that students' learning processes start with concrete experiences where students had to interact with the contents. Students then reflect on these experiences, make sense of them (conceptualize them), and actively engage in a new experience. Kolb pointed out that students usually incorporate these different approaches when they engage in a new content or experience. However, they tend to build strong in one approach over the other. Kolb model proposed four learning styles: converger, diverger, assimilator, and accommodator. Figure 2 is a graphic representation of Kolb's model. The diverger prefers concrete experience and reflective observation, prefers to be personally involved in the task, and perceives information in concrete terms. The converger learner is characterized by abstract conceptualization and active experimentation. He prefers detailed steps in learning, perceives information abstractly, and reflects on these information. The assimilator is characterized by abstract conceptualization and reflective observation who thrives on problem-solving activities, perceives and processes information abstractly, and acts respectively. The accommodator prefers concrete experience and active experimentation who enjoys taking risks, thrives on flexibility in learning activities, and who processes information actively (Kolb, 1984). Based on his theory, Kolb (1999a) developed a learning style inventory (LSI) that has been used extensively in assessing students' learning preferences. The instrument consists of 12 items that ask the student about the best way they prefer to learn. Students were asked to respond to each question in the form of a scenario related to their feelings, the class environment, thinking, and activities. The scores from this inventory describe the learning style types for each individual.

Table 1

Kolb's Learning Styles

Learning styles	Learning Characteristics
Convergers	Active experimentation + Abstract conceptualization
Divergers	Concrete experience + Reflective observation
Assimilators	Abstract conceptualization + Reflective observation
Accommodators	Concrete experience + Active experimentation

Note. Adopted from Smith (2001)

Cohen, Manion, and Morrison (2004) also provide detailed description of each of Kolb' learning styles. He indentified four traits that correspond with each learning style:

1. "The reflector seeking alternatives to create optionsis prepared to wait and watch others until the time is right for action and who tries to retain a sense of perspective.
2. The theorist, who tries to gather all the facts and who is well organized, reviewing alternatives and calculating probabilities, working well independently and learning from his or her own experiences.
3. The pragmatist, who is keen to try out new ideas, techniques and theories who evaluates options and is good at finding out information, who sets goals and takes positive action to meet them, working well independently.
4. The activist, who is prepared to take risks, to become involved with others and to gain new ideas, insights from them, who is active and relies on personal gut feeling to drive his or her actions." (Cohen et al., 2004, p. 177)

Research studies investigated students learning styles using Kolb' LSI have examined its relation to students' choice of major. For example, in their

study, Oskay, Erdem, Akkoyunlu, & Yilmaz, (2010) pointed out that convergers favor majors in technology and medical fields. Whereas, assimilators prefer majors is academia (Oskay et al., 2010). Experimental studies have been also conducted using Kolb's learning styles inventory to highlight the differences between students who experienced differentiated teaching than those who did not. They highlighted the importance for student teachers to know their young students learning styles and taught prospective teachers how they can design the curriculum and the pedagogy that accommodate these differences. Other studies utilized LSI to test gender differences with regard to learning styles. For example, Loo (2004) examined 201 male and female college students where he found that male students tend to be divergers learners whereas women were mostly assimilator learners.

Because students approach learning differently and have varied learning preferences that affect their understanding of the content, teachers have to think about how they can accommodate these differences in curriculum design and instructional choices (Dodge, 2001). Every year Princess Nourah bint Abdulrahman University enrolls thousands of students into different fields of study. Therefore, it is essential to learn and understand students various ways of leaning in order to meet their needs and help them succeed during college years. Furthermore, it is important to understand that different majors or fields of profession require different skills and knowledge in order to do well. Therefore, it is important to acknowledge these differences in learning to provide the curriculum and design the instructions that help students learn effectively. Finally, knowing different learning styles will help understand what affect students' ways of learning and why different majors require different skills. It is also essential to understand how having students in specific fields as in humanities majors hold certain ways of learning might affect education. Although there has been extensive research on the importance of acknowledging these different learning styles in different disciplines (e.g., Clark, 2003; Hattie & Timperley, 2007; Marzano, Pickering, & Pollock, 2001; Pickering & Pollock ,2001) to the researcher knowledge, however, there is a lack of research on students learning styles in

general and in studentteachers' learning styles in specific at Princess Nourah bint Abdulrahman University that investigated their preferencesin accordance with Kolb's learning style theory. The current study chose students from two different domains of study to answer the main question of the research that raises the question of whether or not students in different disciplines have (or adopt) different learning styles. This study investigates student teachers learning preferences and its relation to their GPA and compares it to physical therapy students' learning styles.

Research Questions

The main purpose of the study is to examine Saudi female student teachers preferred learning styles at Princess Nourah bint Abdulrahman University and to compare them with female Saudi students from the physical therapy major.

The present study focuses on the following questions:

1. What are the preferred learning styles of Saudi female student teachersat Princess Nourah bint Abdulrahman University?
2. Is there a relationship between student teachers' learning styles and their GPA at Princess Nourah bint Abdulrahman University?
3. What is the difference between student teachers preferred learning styles and physical therapy students concerning their preferred learning styles and their GPA?

Methods

Participants

One hundred seventy students participated in this study (N= 170). The participants were third year students majoring in elementary education at the college of education and third year students majoring in physical therapy at college of health and rehabilitation sciences at Princess Nourah bint Abdulrahman University in Saudi Arabia during the academic year 2015 -

2016. Ninety-six student teachers and seventy-four physical therapy students responded to the Learning Style Inventory (LSI) developed by Kolb (1999a).

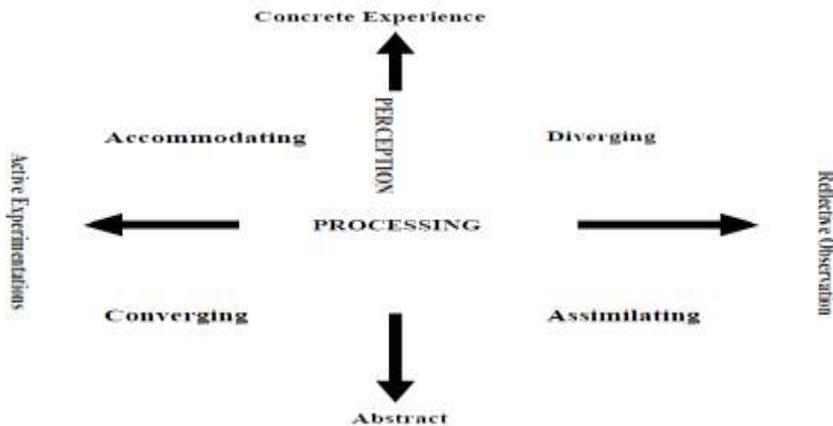
Instrument

The learning Styles Inventory (LSI) developed by Kolb (1999a) was used to answer the research questions. The instrument was based on Kolb's (1984) theory of experiential learning Theory (ELT) that connects experience with learning. It claims that learning is achieved through interaction with two aspects: students' perception of the information and the processing of this information. The Learning Style Inventory aims to identify four learning preferences: concrete experience, reflective observation, abstract conceptualization and active experience. These preferences translated into four learning styles: Accommodator, Divergent, Assimilator, and Converger (Gallagher, 2007). The survey consists of 12 items that describe the best statement reflecting students' learning preference. Each item asks participants to rank order four sentence endings that consist with the four learning modes (Kolb, 1985). In accordance with Kolb's learning style grid (Kolb 1999; Smith, 2001), the scoring process calculates the number of students' responses to each statement to determine their learning style preferences (See figure 2). The Learning Style Inventory is the most widely used instrument in determining students learning preferences. The goal of this instrument is to "follow the learning cycle, emphasizing the LSI as an experience in learning how you learn. New application of information on teamwork, managing conflict, personal and professional communication, and career choice and development were added" (Kolb & Kolb, 2005, p. 10). The LSI is widely used and cited instrument in the area of learning styles, for that reason, this instrument was chosen. There are different versions of Kolb's Learning Style Inventory since its release in 1976. The version 3 (Kolb, 1999 a) was used in this study. The English version of the study was used since the participants of this study were proficient the English language. Smith (2001), as cited by Gallagher, 2007 reported the reliability for each learning style represented in LSI as follow, 0.82 for Concrete Experience, 0.73 for

Reflective Observation, 0.83 for Abstract Conceptualization, 0.78 for Active Experimentation, 0.88 for AC - CE, and 0.81 for AE – RO (Gallagher, 2007, p. 50).

Figure 2

Kolb's is learning styles (Adopted from Kolb et al., 1999)



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0.83 for Abstract Conceptualization, 0.78 for Active Experimentation, 0.88 for AC - CE, and 0.81 for AE – RO (Gallagher, 2007).

Procedure and statistical analysis

The study topic and instrument were approved by the university Vice Rectorates of Graduate Studies and Scientific Research. The researcher received a permission to distribute the instrument to students from college health and rehabilitation sciences and college of education. The instrument was distributed to students from both groups at the beginning of the semester. The professor who was responsible for distributing and collecting the responses explained the instrument purpose and procedure. In order to answer this study's questions, a descriptive analysis was undertaken using the Statistical Package for the Social Sciences (SPSS) to determine the mean and standard deviation for both groups and to analyze student teachers and physical therapy students' learning styles preferences. Based on their scores of AC-CE and AE-RO, four types of learning styles were identified: divergent, convergent, assimilator, and accommodator. An independent t-test was also used to compare between the two groups to determine if the difference between them was significant. To measure the relationship between students' learning styles and their GPA scores correlation analysis was used. Analysis of Variance (ANOVA) was also used to test the student's GPA in relation to the four preferred learning styles.

Results

Four learning styles were extracted from each student: divergent, convergent, accommodator, and assimilator. The descriptive results summarized in Table 2 represents the scores. Accordingly, using AC-CE and AE-RO formula to identify Kolb's four types of learning styles, Accommodators had the highest score ($M=6.86$, $SD= 1.92$) while assimilators had the lowest score ($M= 5.02$, $SD=1.88$). Furthermore, the results revealed that a divergent learning style was the most preferred learning style among

student teachers ($M= 6.38$, $SD=1.75$) and convergent learning style was the least preferred with ($M=5.42$, $SD 1.58$). Physical therapy students scored high as accommodators ($M=7.58$, $SD= 1.47$) and low as assimilators ($M=4.42$, $SD= 1.47$). Figure 2 shows a bar graph of the four learning styles by means of participants.

Table 2

Descriptive statistics of Kolb's learning styles

Total Sample	Convergers	Divergers	Assimilators	Accommodators
N	170	170	170	170
<i>M</i>	5.62	6.26	5.02	6.86
<i>SD</i>	1.535	1.623	1.886	1.921
Physical therapy students	Convergers	Divergers	Assimilators	Accommodators
N	74	74	74	74
<i>M</i>	5.88	6.12	4.42	7.58
<i>SD</i>	1.433	1.433	1.471	1.471
Student teachers	Convergers	Divergers	Assimilators	Accommodators
N	96	96	96	96
<i>M</i>	5.42	6.38	5.48	6.31
Std. Deviation	1.587	1.755	2.042	2.048

Figure 3

Participants' learning styles

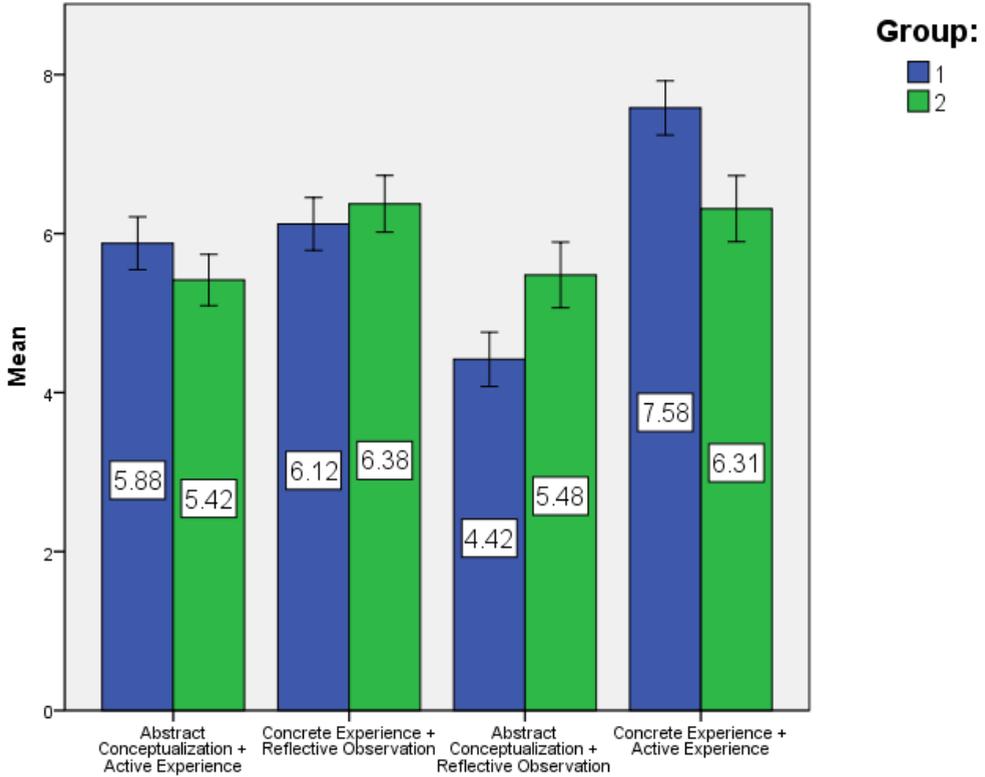


Table 3 shows the correlation results. In the total sample, significant correlations exist only between participants' GPA and active experience (AC) ($r= 0.202, p <0.01$) and small negative correlation exists between participants' GPA and reflective observation (RO) ($r=-0.228, p <0.01$). There were no correlations with concrete experience (CE) and abstract conceptualization (AC) scores. However, in group 1 and group 2 when examined separately, no significant correlations have been found between GPA and learning styles.

Table 3

Correlation between Participants' GPA and Learning Preferences

Total Sample		GPA
Concrete Experience	Pearson Correlation	0.080
	Sig. (2-tailed)	0.310
	N	162
Abstract Conceptualization	Pearson Correlation	-0.093
	Sig. (2-tailed)	0.241
	N	162
Active Experience	Pearson Correlation	0.202**
	Sig. (2-tailed)	0.010
	N	162
Reflective Observation	Pearson Correlation	-0.228**
	Sig. (2-tailed)	0.004
	N	162

** . Correlation is significant at the 0.01 level (2-tailed).
* . Correlation is significant at the 0.05 level (2-tailed).

Lastly, Table 4 and Table 5 display the results for the analysis of variance (ANOVA). Students were distributed to one of four groups, according to their preferred learning style. Differences between these groups regarding GPA were examined by using ANOVA. The results revealed that GPA significantly differ between four groups ($F(3, 107) = 8.092; p = .000$). In order to test these differences further, LSD post-hoc test was used. The Results revealed that significant differences regarding GPA exist only between RO, CE, and RO and AE. Students using RO learning style have a significantly lower GPA. Active experimentation learning style students have higher GPA ($M = 4.34$) than the concrete learning style students ($M = 4.26$) and abstract conceptualization ($M = 4.07$). Reflective observers, however, have a significantly lower GPA ($M = 3.81$) than the three other types of learning styles.

Table 4

Descriptive Statistics of GPA Scores and by Learning Styles

Dependent Variable: GPA			
LEARNINGSTYLE	<i>M</i>	<i>SD</i>	<i>N</i>
CE	4.26	0.47	45
AC	4.07	0.47	11
AE	4.34	0.35	33
RO	3.81	0.36	22

Table 5

Analysis of Viariance (ANOVA)

Dependent Variable: GPA						
(I) LEARNIN G_STYLE	(J) LEARNIN G_STYLE	Mean Differenc e (I-J)	Std. Error	Sig. _b	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
CE	AC	0.18	0.14	0.18	-0.09	0.47
	AE	-0.08	0.09	0.38	-0.27	0.10
	RO	0.44*	0.11	0.00	0.23	0.66
AC	CE	-0.18	0.14	0.18	-0.47	0.09
	AE	-0.27	0.14	0.06	-0.56	0.01
	RO	0.26	0.15	0.09	-0.04	0.56
AE	CE	0.08	0.09	0.38	-0.10	0.27
	AC	0.27	0.14	0.06	-0.01	0.56
	RO	0.53*	0.11	0.00	0.30	0.76
RO	CE	-0.44*	0.11	0.00	-0.66	-0.23
	AC	-0.26	0.15	0.09	-0.56	0.04
	AE	-0.53*	0.11	0.00	-0.76	-0.30

* The mean difference is significant at the .05 level.

Table 6

Analysis of Variance (ANOVA) of Learning Styles and GPA

Source	Type III Sum of Squares	<i>df</i>	Mean Square	<i>f</i>	Sig.
Between subjects effects Groups	4.303	3	1.434	8.092	0.000

Discussion

The purpose of the study was to investigate Saudi female student teachers and physical therapy students preferred learning styles. The study compared both groups learning preferences in relation to their GPA. For both groups, accommodating learning style was the dominant one $M=6.86$, $SD=1.92$. The divergent learning style was the preferred learning style among student teachers $M = 6.38$, $SD= 1.75$ and convergent learning style was the least preferred one with $M=5.42$, $SD = 1.58$. Whereas Physical therapy students scored high as accommodators ($M = 7.58$, $SD = 1.74$) and low as assimilators $M =4.42$, $SD= 1.47$. To the knowledge of the researcher, no research has been done on Saudi student teachers students learning styles using Kolb's LSI. Therefore, no inference can be made with the absence of the studies that support the current findings for teacher education. Most studies, however, investigated Saudi students learning preferences found that college students preferred sensory modality (visual, auditory, kinesthetic) type of learning. According to Folder and Silverman (1988), sensory learners are oriented towards hand-on experiments and practical work (interactive learning). In contrast, reflective learners prefer to think about and reflect on their knowledge and experiences. Most studies conducted on Saudi students' learning styles investigated students from health profession and medical fields. For example, in a study conducted by Al-Gahtani & Al-Gahtani (2014) on Saudi dental students found that Saudi dental students preferred diverging learning style. During the clinical years, students gather knowledge and experience in clinical settings and apply it in patient management and communication with dental personnel. These students begin to develop a diverging learning style. Physical therapy students participated in this study preferred accommodating learning style. The differences uncovered among these results could be attributed to differences in the major requirements and the teaching methodologies among groups.

The findings of the study were different from the studies where the sample was not similar (e.g., Oskay, Erdem, Akkoyunlu, & Yilmaz, 2010; Peker & Mirasyedioglu, 2008; Rosenau, 2006; Tulbure, 2011). The current study measured samples from two different domains: humanities and health professions. The majority of these studies investigated students learning styles comparing students within same major or used the gender as a factor to study the differences (e.g., Demirbas, 2001; Lie, Angelique, & Cheone, 2004; Raghuvver, Puja, & Tandon, 2011). The first finding of the study showed that participants preferred an accommodating learning style. As pointed out above, the two domains in which the sample was chosen explained why accommodating was the predominately the preferred learning style. Accommodators prefer hands-on activities and prefer to act on feeling rather than logic. These traits exemplify both divergent and accommodating learning styles.

The analysis of each group separately showed that student teachers preferred divergent learning style. This finding is consistent with similar research on student teachers' learning styles from different education systems (Güven, 2003; Cavas, 2010; Eyyam, Menevis, & Dogruer, 2011). Divergers are imaginative and creative; they focus on others' ideas and they are less concerned with theories and logic. They act on their feelings (Cavas, 2010). In the first group, the study test represents student teachers who are starting their senior year. At this level, student teachers have already gained the knowledge through their field work and communication with school staff. This could have shaped their learning preferences. Consequently, group activities, and hands on activities that encourage discovery and imagination are the most suitable type of teaching for student teachers. Other studies, however, found on student teachers' learning styles reported assimilating learning style as their most preferred one (Kablan & Kaya, 2013; Peker & Mirasyedioğlu, 2008; Tulbure, 2011). The differences among these studies could be contributed to the differences found in the education system, culture, or the program requirements (Kaz & Heiman, 1991; Lee, Hu, & Wu, 2013; Wessel, et al., 1999; Wang.). Regarding physical

therapy students, the study found that the majority preferred accommodating learning style. This finding is inconsistent with similar studies from different education systems conducted on students from similar fields: nurse, dental, medial, health professions (AL-Qahtani & Al-Gahtani, 2013; Cavanaph, Hogan, & Ramgopal, 1995; D'Amore, James, & Mitchell, 2012; Ghaffari, Ranjbarzadeh, Azar, Hassanzadeh, Safaei, Golanbar, Mazouchian, & Abbasi, 2013). Accommodators learn best when involve on hands on activities and they depend heavily on others for information and ideas. Similar to divergers, they act on feelings rather than logic. Other studies have found that large numbers of students in the fields of sciences as well as the health profession tend to be assimilators. Assimilator students are expected to do many hand-on activities, actively value logic, and are interested in abstract concepts and ideas. As pointed above, the differences found in these samples could be due to differences found in the education system, the requirements, and the teaching methods used in the country. Kolb (1984) pointed out that different occupations might indicate different learning preferences. Therefore, these results may reflect the relationship between learning styles and occupations (Oskay, Emine, Akkoyunlu, & Yilmaz, 2010). To summarize from the above results that both divergent and accommodators learning styles dominate the study sample. Therefore, instructors should match their teaching approaches with students' individual styles.

Lastly, one of the purposes of the study was to investigate the relationship between students' GPA and their preferred learning styles. What the study found indicates that there is a significant relationship between learning styles and students' GPA. Participants who are divergers from both groups have lower GPA than participants who score high as accommodators. This means that even though the sample of the study represents different domains of learning there were accommodators have higher GPA than divergers. This means that students learning styles could act as a predictor of academic achievement (Soghra & Mohammad, 2013). Overall, different learning styles lead to different GPA scores.

Conclusion

The present study showed that among Princess Norah bint Abdulrahman University undergraduates were the divergers and the accommodators learning preferences in two different fields of professions. What the study revealed agreed with what Kolb (1984) suggested that students' professions and majors could influence and shape their learning preferences and academic achievement. Therefore, these results have implications for educators in both professions to employ various teaching methodologies and adopt different evaluations methods to enhance students learning and academic performances. The study's findings should be interpreted carefully since the sample from both groups was not high. Furthermore, examining large number of students from different disciplines could contribute to a greater understanding of the results and help make valid comparisons and inferences.

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