Assessment of students’ learning styles preferences in the faculty of science, Tishreen University, Syria

Abdullatif Ismaila *, Raja Maznah Raja Hussaina, Shahrir Jamaluddina

aP.O. 44 Damascus, Syria, 50603 Kuala Lumpur, Malaysia

Received November 2, 2009; revised December 10, 2009; accepted January 18, 2010

Abstract

Stating the way in which a learner begins to concentrate on, processes, absorbs, and retains new and difficult educational situation or problem is expected to assist the learner in the development of effective study strategies. Knowing students learning preferences will help lecturers to better design learning materials and teaching styles. The research aims to find out the learning preferences of students in the faculty of science in Tishreen University, the differences in learning styles or preferences between male and female students and between departments in the science faculty. Ninety-seven first year and second year students from four departments participated in the survey. Non-parametric procedures were used to test the research questions. In the evaluation of the differences of learning styles or preferences among departments, the Kruskal-Wallis test, was used as a non-parametric method. This effectively tested the hypothesis of equal distributions of three or more independent samples. Results show that the students prefer different learning styles: Visual/Verbal, Audio/Verbal, Visual/Non Verbal and Tactile/Kinesthetic. A finding of significant difference indicated that the two samples of females and males differed on the variable of interest. There are very few significant differences among departments. The paper discusses the findings and the implications to designing of instruction in higher education. It will conclude with recommendations to lecturers to accommodate their teaching styles so that it is compatible with their students learning styles and preferences.

© 2010 Elsevier Ltd. Open access under CC BY-NC-ND license.

Keywords: Learning styles; learning preferences; mann-whitney test; cross tabulation; kruskal-wallis test.

1. Introduction

Learning styles are any strategies or mental behaviours that are applied by learners to learning in a particular educational situation or problem. Dunn and Dunn (1992; 1993) define learning style as the way in which each learner begins to concentrate on, process, absorb, and retain new and difficult information.

Naturally, different people are expected to prefer a certain single different learning style. So, the situation of that individual doing this in very different ways is a fact. Although, knowing factors that influence a person’s preferred style is highly important, this is not the purpose of this research. The research aim is to seek answers to the following three questions:

1. What are the learning styles which students prefer?
2. Are there any learning styles preference differences among the females and males?
3. Are there any learning styles preference differences among the departments (Departments: Science, Physics, Math, and Geology)?

The results of the study are expected to assist University students in the development of effective study strategies. Furthermore, the results will help lecturers to better design learning materials and strategies.

2. Importance of the study

Literature confirms that different learners benefit differently from the same material. This is a very deep psychological issue in learning and learner’s behaviour. One of the arguments that try to explain this phenomenon is that different people are naturally expected to prefer a certain single different learning style. Therefore, teachers worked continuously to create different kinds of teaching material.

Knowing such students preferences of learning styles will help lead to an effective design of learning and teaching materials and strategies as well. Such design will reflect many individual differences that are resulting from each person’s biological developmental and psychological experiences. The following summarises the significance of the study:

- Permits the students to identify how they prefer to learn.
- Indicates the methods through which students are likely to excel.
- Explores if there are any differences among male and female in regard to learning styles preferences and finally,
- Explores any learning styles preferences among departments (Science, Physics, Math, and Geology).

3. Learning Styles

Learning style is known as the way that individuals perceive and process information. Keefe (1979) defined learning styles as “characteristic cognitive, affective, and psychological behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment”. So, based on Keefe (1979) three indicators control or affect the learner’s learning styles, the cognitive, affective, and psychological behaviors. Clearly, this leads us to the fact that different people learn different things in different ways. Some learners used to process experiences and knowledge sequentially, others are used to do it randomly; some learners are highly analytical in decision making, while others use their feelings for deciding; some learners are oriented visually; others are oriented verbally; some learners prefer to learn in groups; others prefer to learn alone and in home, etc.

However, the concept of learning styles is still a controversial matter in the literature of learning and teaching. Felder (2005) indicates that the concept of learning styles is not universally accepted.

3.1. The classification of the Learning Styles

Learning styles are classified in many different ways. One classification method focuses on the route by which students best perceive and remember information: visual, auditory, or kinaesthetic (Chafee, 1999). Grasha and Reichmann (2006) developed learning style inventory to identify and categorize student learning behaviour preferences as Avoidant, Dependent, Participant, Independent, Competitive, and Collaborative.

According to Grasha and Reichmann the avoidant students are not enthusiastic about learning content and attending class; the dependent students show little intellectual curiosity and learn only what is required; the participant students are good citizens in class; the independent students like to think for themselves and are confident in their learning abilities; the competitive students learn material in order to perform better than others in the class; and finally the collaborative students typically feel that they can learn by sharing ideas and talents.

Another learning style model is designed by Felder and Silverman (2004). The model has four dimensions and focused to assess the learner’s learning styles preferences. The four scales are as follows: 1. Sensing (concrete, practical, oriented toward facts and procedures), or Intuitive (conceptual, innovative, oriented toward theories and underlying meanings); 2. Visual (prefer visual representations of presented material, such as pictures, diagrams, and flow charts) or Verbal (prefer written and spoken explanations); 3. Active (learn by trying things out, enjoy working in groups) or
Reflective (learn by thinking things through, prefer working alone or with one or two familiar partners); and finally 4. Sequential (linear thinking process, learn in incremental steps) or global (holistic thinking process, learn in large leaps).

The questionnaire used in this study was developed by (Mencke & Hartman, 2000) from the University of Arizona and was used to assist college students in the development of effective study strategies. The questionnaire is flexible and reliable. It has 25 questions with three choices for each (Often, Sometimes, and seldom). The questionnaire is grouped according to the classification of (Chafee, 1999). Thus, the standard learner reaction to the information, visual, auditory, and kinaesthetic is under the focus.

3.2. Data analysis

3.2.1. Participants

97 of students returned the questionnaires out of 100 (45 females and 52 males) - a response rate 97% - with ages ranged from 18 to 26 years, with a mean age of 20 years (SD=2).

3.2.2. Research question 1.
What are the learning styles that students prefer?

Results indicate that student’s preferences ranged through the three traditional categories of learning styles: Visual, Audio, and Kinesthetic as seen in the Table 1.

3.2.3. Research question 2.
Are there any differences in learning styles preference among the females and males?

A Mann-Whitney Test, tests whether an ordinal or interval variable measured in each of two independent samples can be assumed to come from the same underlying population. Z scores of less than 1.96 indicates that the two samples come from the same underlying distribution, at the p=.05 significance level. The effect size is calculated using the formula, 

\[ r = \frac{Z}{\sqrt{n}}. \]

The process is done on two stages, first within each department separately, and second among the department as a whole.

Stage 1. The results of Mann-Whitney Test indicate few significant differences among males and females through some learning styles preferences:

Math Department. Males (N=12) differs with females (N=12) in three learning styles preferences cases (q3, q12, & q23), (U3=38.00, Z3= -2.097, r3= -0.43), (U12=23.00, Z12= -3.082, r12= -0.63), and (U23=27.50, Z23= -2.739, r23= -0.56)

Physics Department. Males (N=13) differs with females (N=12) in three learning styles preferences cases (q14, q18, and q21). (U14=33.00, Z14= -2.737, r14= -0.47), (U18=47.00, Z18= -2.138, r18= -0.43), (U21=40.00, Z21= -2.227, r21= -0.46)

Chimistry Department. Males (N=11) differs with females (N=11) in two learning styles preferences cases (q20, q27). (U20=33.500, Z20= -1.994, r20= -0.43), (U26=33.00, Z27= -2.472, r27= -0.53)

Geology Department. Males (N=16) differs with females (N=10) in three learning styles preferences cases (q9, q10, and q16). (U9=42.00, Z9= -2.331, r9= -0.46), (U10=32.500, Z10= -2.755, r10= -0.54), (U16=50.00, Z16= -2.149, r16= -0.42)

Stage 2. The results of Mann-Whitney Test indicate only one case significant difference among females and males: (U13=930.00, Z13= -2.603, r13= -0.38).
3.2.3. Research question 3.

Are there any learning styles preference differences among the departments (Departments: Science, Physics, Math, and Geology)?

Kruskal-Wallis test (independent group comparison test) can be used to compare the medians of three or more groups. Therefore, a Kruskal-Wallis test was conducted to evaluate differences among the four Departments (Science, Physics, Math, and Geology) on median change in the learning styles preferences. The results of the Kruskal-Wallis Test indicate that the four groups differ significantly in five cases only (q5, q10, q11, q13 and q19).

The results of the analysis indicate that there is a significant difference in the medians for these five questions: q5: \(X^2(N=97, 3) = 9.946, p=0.019\), q10: \(X^2(N=97, 3) = 9.621, p=0.022\), q11: \(X^2(N=97, 3) = 9.134, p=0.028\), q13: \(X^2(N=97, 3) = 8.830, p=0.032\), and q19: \(X^2(N=97, 3) = 8.246, p=0.041\)

4. Discussion

4.1. Research question 1.

The students learning styles preferences spread over visual, audio and Kinesthetic. This is quite logical and reasonable. However, the visual learning style was much more preferred by students. The results are similar to those in the literature as most population are visual, sensing, inductive, and active (felder, 1988). Often and Sometimes choices in the preferences related to audio learning styles are relatively close to each other. Students also indicated preference for the Kinesthetic learning styles.

4.2. Research question 2.

A finding of significant difference indicates that the differences among females and males on the variable of interest are much related to the department itself. That is, females could differ with males regarding the learning styles preferences in one department but do not differ in other department for the same learning styles.

4.3. Research question 3.

The departments differ in the learning styles preferences with five learning styles (q5, q10, q11, q13, and q19). Those are distributed on visual and audio styles. These differences are due to the differences among the nature of the departments themselves.

The null-hypothesis for the five cases (q5, q10, q11, q13, and q19) is rejected -The samples come from different populations-since (P<.05), the conclusion is that there is statistically significant differences between the four groups with regards to the answers to those five cases.

5. Conclusion

Effective teaching and training cannot be limited to the delivery of information itself regardless of considering the way learners perceive, interact with, and respond to the learning environment. Effective instructors are those who understand the importance of involving all of their students in learning. Effective learning occurs when instructors affirm the presence and validity of diverse learning styles and maximise the climate or conditions for learning in and out of the classroom through the deliberate use of instructional design principles that take account of learning differences and increase the possibilities of success for all learners. Analysis results indicate that students are not fully Visual, Audio or Kinesthetic. This is quite sound and rational. Lecturers are invited to consider those learning styles differences among females and males within each department. They are invited too to consider the learning styles differences among departments. Lecturers are indeed invited to take care of the teaching strategies and methods.
For Visual learners, the lecturer must consider highlighting the different kinds of information in contrasting colors; tries to write out sentences and phrases that summarise key information at the end of each paragraph or topic; makes flashcards of vocabulary words and concepts that need to be memorised; etc.

For Kinesthetic learners, lecturer must think about activities which involve those students to use ‘hands’; must allow them to sit near the front of the class; allows them to walk back and forth while reading or answering the test; etc.

For Audio learners, lecturer must think seriously about his/her oral language format; how to involve those students in group discussions; lecturer must allow those students to record the lectures as well; etc.

Thus, learning styles are one major factor of the success in learning and teaching.

6. Further study

Further study to be conducted involves asking the question related to compatibility of learning styles with teaching styles at the university

<table>
<thead>
<tr>
<th>Scale</th>
<th>No. of scale items</th>
<th>Visual</th>
<th>Audio</th>
<th>Kinaesthetic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Range of items means</td>
<td>Students N=97</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lowest item mean</td>
<td>Highest item mean</td>
<td>Mean</td>
</tr>
<tr>
<td>Visual</td>
<td>11</td>
<td>1.23</td>
<td>1.89</td>
<td>1.49</td>
</tr>
<tr>
<td>Audio</td>
<td>7</td>
<td>1.44</td>
<td>2.25</td>
<td>1.76</td>
</tr>
<tr>
<td>Kinaesthetic</td>
<td>9</td>
<td>1.13</td>
<td>2.34</td>
<td>1.89</td>
</tr>
</tbody>
</table>

1: Often, 2: Sometimes, 3:Seldom

References


