# STUDY OF LEARNING STYLES AND THEIR ROLES IN THE ACADEMIC ACHIEVEMENT OF THE STUDENTS OF PAYAME NOOR UNIVERSITY (PNU)

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## ABSTRACT

**This paper reports on a research done to study learning styles and their roles in the academic achievement of the students of Payame Noor University (PNU), Ardebli center, Iran. 184 students (90 male and 94 female students) in the fourth semester are chosen as our sample using Cocran's formula and random sampling. The questionnaire memletics is used to collect data about learning styles. Reliability of this questionnaire is calculated as $\alpha$=0.81 using Cronbach's alpha. Total average of students' scores in four semesters is taken as a criterion for academic achievement. Findings show that most of male students use verbal and solitary learning styles. Most of female student use aural and verbal learning styles. The academic achievement of female students is more than the academic achievement of male students. Among the students of Payame Noor University, those who use visual learning style have the greatest achievement. Students with social, aural, verbal, and solitary learning styles are in the following ranks respectively. Students with logical and physical learning styles have the least academic achievement.**

**Keywords: learning styles, memletics, distance education, academic achievement**

## INTRODUCTION

**Technological development and industrial revolution in the middle of nineteenth century made feasible distance education. In two recent decades, distance learning has achieved to its greatest development so that education faces new methods, tools, and communicative environment.**

**This revolution in transferring and presenting education has made different people with different abilities and needs in different times and places capable of learning. In other words, the existence of different methods of education makes necessary considering individual differences.**

**Cognitive approach is one of important theories of learning which emphasizes the individual differences in learning. In this theory, the importance of individual differences in learning is recognized. To adapt with theses differences, a group of various learning strategies in e_learning is used (Anderson & Elloumi, 2004)**

**Learning styles are among these differences. Learning styles indicate that how a learner perceives, interacts with, and responds to the environment. In fact, learning style is a criterion for individual differences. O' Connor (1997) describes learning styles as self made filters used by people to account for their relation with the world. Learning styles of individuals direct their method of learning. They change the way people express their inner experiences, how they remember things, and even the words they choose. Dechecco and Growford (1974) define learning styles as "individual ways in which people process information in learning concepts and principles". Peirce (2000) defines learning style as "the way student prefers in learning materials "(Seif, 2001).**

**Kolb also defines learning styles as the ways through which people produce concepts, rules and principles which directs them in new situations (Noogabi, 1999). Grashe (1996) defines learning styles as individual characteristics and qualities which influence the ability of a learner in acquiring information, interaction with learners and teacher, and his abilities to take part in learning experiences.**

**In summary, learning style is a group of interrelated characteristics in which the general is larger than the specific i.e. learning style is Gestalt in which internal and external operations are derived from individual's neural biology. It combines his personality and growth and shows them as a behavior (Keefe & Ferrell, 1990). Learning styles and paying attention to them in the electronic and distance education raised discussions among university students and teachers and administrators of education (Pallof & Pratt, 2003). Findings of researchers show that people learn more when they are aware of their learning styles (O'Connor, 1997). Researchers believe that learning style is a good predicator for individual's preferred learning behavior (Bostrom, Olfman, & Sein, 1993). Moreover, the identification of learner's learning styles helps educational planners and teachers provide learners necessary educational support and supplies (Anderson& Elloumi, 2004) because learning styles are influential factors in learners' learning.**

**Individuals acquire leaning styles and techniques according to their individual differences like other abilities through experience (Seif, 2001). Furthermore, the findings obtained from studies done about individual differences in learning field show how people are different in dealing with an assignment. These differences are not indicator of their intelligence or especial abilities. They are related more to the preferred methods which different people use to process and organize information to react to the environmental stimuli (Seif, 2001).**

**Disregarding the method or theory which learner adopts according to the subject, the vital issue is considering the differences which are available in distance education and electronic education, especially the education based on the internet. This is not a true assumption that distant learners, especially those who receive education through internet, have the same insights and feelings. Although internet is cited as a big equalizer, dealing with learners should be done considering individual differences in learning, gender, culture, and ability (Pallof & Pratt, 2003).Kolekston and Morel (1988) believe that learners may use matching or mismatching learning styles based on their educational ambitions and goals. They believe that matching teaching and learning activities with educational goals are especially valuable when dealing with fresh students in the university or dealing with those who are less prepared for learning. Therefore, the least educational decline and the most influential learning take place when the learning style is in harmony with lesson goals. But, mismatching of lesson goals with learning styles is also valuable because students can learn how to learn using new methods and they can develop their potential abilities in different fields.**

**According to O'Conner (1997), a teacher can do various activities to improve learners' learning taken into account their learning styles. Studies about learning show that considering learning styles in planning and presenting education can improve learning processes meaningfully (Dwyer, 1998). Lindsay (1999) found that the harmony between learning style and teaching style increased academic achievement and satisfaction with learning. It is emphasized in most of researches that individual preferences of the teacher and educational planners in presenting topics should be based on the learners' learning styles because learning styles can influence the efficiency of educational materials, their models, and methods (Griggs, 1991a; Griggs, 1991b; Renniger et al., 1992; Wilson, 1996; Warren & Dziuban, 1997; Montgomery & Grout, 1998; Goold & Rimmer, 2000). Therefore, it is better to make the content of electronic learning include activities appropriate for various learning styles so that learners can choose suitable activities based on their preferred style.According to Kolb's view, learners with concrete-experience style prefer environments in which they are engaged. They prefer to deal with their peers not with those of responsibility and authority. They like group work and feedback of their peers. They consider their teachers as a coach or helper. These learners prefer supporting methods which allow them to interact with peers and acquire guidance for their teachers. Learners with reflective-observation style like to observe reflectively before doing each action. This group prefers to have all necessary information in hand.**

**They consider the teacher as a specialist. They don't like to have interaction with other people. These learners with conceptualizing abstract style prefer to deal with objects, things, and signs not with people. They like to deal with theory and organized analyses. Active experimental learners prefer to learn through doing operational projects and group discussions. They prefer active learning methods and interactions with fellows to acquire feedback and information. They prefer to devise criteria to evaluate situations. In addition to activities for students with various learning styles, there should be sufficient support for them. As mentioned before, most of specialists believe that information should be presented in different ways to become adaptable with individual differences in processing information and to be transferred easily to the long term memory.**

**Information should be presented textually, orally, and visually as far as possible to make feasible better coding. According to the dual coding theory (Paivio, 1986), information acquired through different methods (textual and pictorial) are processed better in comparison with the information presented in one way (textual). Dual encoded information is processed in different parts of brain and leads to more coding (Anderson & Elloumi, 2004)**

**Hohen (1995) mentions that field independent learners prefer to work alone. They are able to organize their efforts in doing projects and solving organizational problems. They like to determine their goals themselves. However, field dependent learners prefer to work in group and interact more with the teacher. They need organized assignments and external stimulus. It seems that field independent students in Payame Noor University, which has distance and non participating educational system, to be more successful than field dependent students. On the contrary, in the research done by Saramdi and Zare (2006), a significant difference between theses groups is not observed. In different studies, like in the research done by Valenta and his colleagues, it is concluded that distance learners' learning styles are influential in their academic achievement. Also Diaz (1999) concludes that distance learners were significantly more field independent in comparison with the learners of conventional education.**

**Diaz believes the learning styles of distance education learners are very important in their academic achievement and those whose learning is in harmony with distance education system (field independent) are more successful. Fan et al. (1999) found that learners who studied in Open University of Hong Kong had field independence learning style and they had more academic achievement (Sarmadi & Zare, 2006). Homayooni and Abdollahi (2003) found a positive and significant correlation between the academic achievement and cognitive styles of students in Mathematics and English language. In the research done by Abdollahpour, Kadivar, and Abdollahi, (2005), field independent learners had significant superiority in Mathematics and they used cognitive and metacognitive strategies. However, Shams Esfandabadi and Emamipour (2003) didn't find a significant difference between learning styles and academic achievement. In their study, female students had verbal and sequential learning style and the male ones had visual and general learning style. Nikmanoochehr (2002) concluded that the effect of learning styles in teacher centered (traditional) classes had not been significant in academic achievement. But in web centered (electronic) classes, there was a significant difference. On the contrary, findings of Hajzeyodin (1999) showed that there was no significant relationship between learning styles and efficiency (Nickmanoochehr, 2002). Desai (1996) found that learning style had no significant effect on subjects' learning.**

**As mentioned before, there are different classifications for learning styles. One of these new classifications is seven-style classification (www.memletics.com) based on memletics. From this point of view individuals may have these learning styles:**

- ***Visual (spatial)*: These people prefer using pictures, imageries, and spatial perceptions.**
- ***Aural (auditory- musical):* These people favor using sounds and music.**
- ***Verbal (linguistic):* They prefer using words in speaking and writing.**

- ***Physical (kinesthetic):*** **They favor using body, hands, and tactile sense.**
- ***Logical (mathematical):*** **They prefer using logic, reasoning, and systems.**
- ***Social (interpersonal):*** **They favor learning in groups or with other people.**
- ***Solitary (intrapersonal)*****: They prefer to work alone and to be a self reader.**

**In this view, people often have one or two preferred prominent styles although they use other styles, too. An important point is that it is possible to make learners' learning styles appropriate to the educational materials and use the tools to present them through necessary education. Therefore, learning styles of male and female students in Payame Noor University are studied and the prominent styles are identified in this research. Moreover, the interactive effect of learning styles with gender on academic achievement is studied.**

## METHODOLOGY

### Sampling

**Population of this research is the students in the fourth semester of Payame Noor University, Ardebil center, Iran (about 1100 female and 800 male students). Random sampling is used to choose the sample group and it is done independently in each group. This sample is calculated using Cocran's formula** $n = \frac{NZ^2\alpha/_2\ \sigma^2}{(N-1)d^2 + Z^2\sigma^2}$ **taken into account** $\delta 2=12.58$**(obtained from pilot study not taken into account the kind of style),** $z\alpha/2= 1.96$**, and d=0.5. Finally, considering some additional subjects to have more exactness, 94 female and 90 male (total=184) subjects are chosen as our sample.**

### Instrument

**The instrument of this research is a learning style questionnaire with 70 questions. This questionnaire with the title memletics is obtained from the site www. memletics.com. It is translated to Persian language by researcher. Then it is administered preliminarily to 15 subjects and its probable shortcomings are corrected. After correction, the final questionnaire is administered to 25 subjects in Payame Noor University. The results are analyzed to determine reliability using Cronbach's alpha method.** $\alpha= 0.81$ **shows that the test has acceptable reliability. This test has the ability to identify seven learning styles. Ten questions are assigned to each style. Subjects choose one of alternatives 0, 1, 2 for each question. Total average of students' scores in four semesters is taken as a criterion for academic achievement.**

### Data Collection Procedure

**The questionnaires are distributed among students in Payame Noor University, Ardebil center. They are collected after being filled by students. To provide interest on the part of students to fill the questionnaire exactly, they are said that the results of each questionnaire will be analyzed individually and given to them.**

**This promise is fulfilled properly. The obtained data are reported descriptively through tables and figures. Then they are analyzed using SPSS software.**

## FINDINGS

**To find the preferred learning styles of the students of Payame Nooor University taken into account their gender two steps are taken. First, the maximum score obtained by subjects in seven styles is considered as the criterion for the preferred prominent learning style. The relative distribution of learning styles of the students of Payame Noor University based on their gender is shown in table 1.**

**Table: 1**
**Distribution of students' learning styles**

| Style / Gender | | visual | verbal | aural | physical | logical | social | solitary | total |
|---|---|---|---|---|---|---|---|---|---|
| Female | frequency | 16 | 18 | 26 | 4 | 16 | 4 | 10 | 94 |
| | percentage | 17.0 | 19.1 | 27.7 | 4.3 | 17.0 | 4.3 | 10.6 | 100 |
| Male | Frequency | 4 | 42 | 6 | 6 | 8 | 10 | 14 | 90 |
| | percentage | 4.4 | 46.6 | 6.7 | 6.7 | 8.9 | 11.1 | 15.6 | 100 |
| Total | frequency | 20 | 60 | 32 | 10 | 24 | 14 | 24 | 184 |
| | percentage | 10.9 | 32.6 | 17.4 | 5.5 | 13.00 | 7.6 | 13.00 | 100 |

**According to Table: 1, verbal learning style (32.6%) is most widely used among students. Aural learning style (17.4%) has the second rank. Physical learning style (5.5%) and social learning style (7.6%) has the least distribution. Prominent learning styles based on g (19.1%) styles among female students and ver o) styles among male students. Findings are pre**

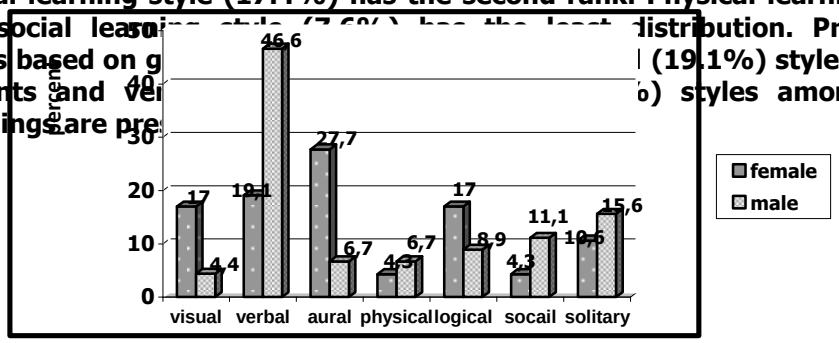


**Figure: 1**
**Percentages of students' learning styles**

**Also, the mean of students' scores in seven learning styles are shown in table 2.**

**Table: 2**
**Students' learning styles**

| learning style | number | | mean | | standard deviation | |
|---|---|---|---|---|---|---|
| | female | male | female | male | female | male |
| **visual** | **94** | **90** | **10.93** | **11.07** | **3.2** | **2.50** |
| **verbal** | **94** | **90** | **11.72** | **12.89** | **3.03** | **1.84** |
| **aural** | **94** | **90** | **12.15** | **10.84** | **2.44** | **2.44** |
| **physical** | **94** | **90** | **9.17** | **9.91** | **2.91** | **2.25** |
| **logical** | **94** | **90** | **10.57** | **10.62** | **3.26** | **3.56** |
| **social** | **94** | **90** | **11.00** | **11.64** | **3.00** | **2.08** |
| **solitary** | **94** | **90** | **10.98** | **12.66** | **2.10** | **2.94** |

**As shown in table 2, verbal style (12.89) has the highest mean among male students. Solitary style (12.66) has the second rank among them. Aural learning style (12.15) and verbal style (11.72) have the highest means among female students. Findings are shown in Figure 2.**

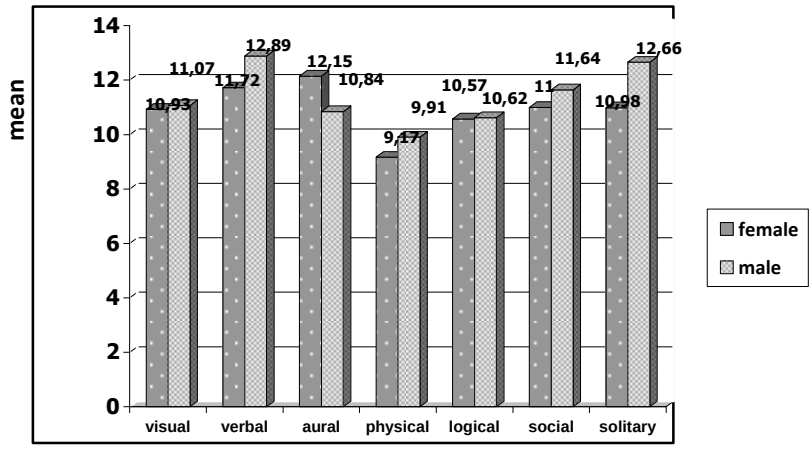


**Figure: 2**
**Mean scores of students' learning styles**

**Table: 3**
**Students' academic achievement**

| style | gender | mean of academic achievement | standard deviation | number |
|---|---|---|---|---|
| visual | female | 14.37 | 0.51 | 16 |
| | male | 14.24 | 0.30 | 4 |
| | total | 14.34 | 0.47 | 20 |
| verbal | female | 14.33 | 1.28 | 18 |
| | male | 14.01 | 0.67 | 42 |
| | total | 14.11 | 0.90 | 60 |
| aural | female | 14.15 | 0.50 | 26 |
| | male | 13.87 | 0.33 | 6 |
| | total | 14.09 | 0.48 | 32 |
| physical | female | 13.45 | 0.29 | 4 |
| | male | 13.33 | 0.52 | 6 |
| | total | 13.38 | 0.42 | 10 |
| logical | female | 13.81 | 0.25 | 16 |
| | male | 13.25 | 0.46 | 8 |
| | total | 13.63 | 0.42 | 24 |
| social | female | 14.5 | 0.57 | 4 |
| | male | 14.10 | 0.61 | 10 |
| | total | 14.22 | 0.61 | 14 |
| solitary | female | 14.60 | 0.52 | 10 |
| | male | 13.57 | 0.51 | 14 |
| | total | 14.00 | 0.72 | 24 |
| Total | female | 14.19 | 0.73 | 94 |
| | male | 13.84 | 0.64 | 90 |
| | total | 14.02 | 0.71 | 184 |

**MANOVA is used to answer the question about the meaningful of difference between the academic achievement of students and their learning styles in interaction with gender. Findings are shown in tables 3 and 4.**

**Table: 4**
**Test of Between_Subject Effects**

| source | sum of squares type III | df | mean square | F | sig |
|---|---|---|---|---|---|
| style | 12.05 | 6 | 2.01 | 4.77 | 0.000 |
| gender | 4.68 | 1 | 4.68 | 11.13 | 0.001 |
| style * gender | 2.95 | 6 | 0.49 | 1.17 | 0.325 |
| error | 71.57 | 170 | 0.42 | | |
| total | 36272.78 | 184 | | | |

**Depend variable: students' academic achievement**

**According to table 4, in comparing the academic achievement of students with different learning styles, the obtained F (6,170) = 4.77, P= 0.000<0.05 is significant. It can be concluded that the academic achievement of students with different learning styles is different. This difference is examined two by two using Post hoc test (LSD) and shown in table 5. Moreover in comparing the academic achievement of male and female students, the obtained F (1,170) =11.13, P=0.001<0.05 is significant.**

**Table: 5**
**Multiple comparisons**
**(Depend variable: students' academic achievement)**

| Style I | J | difference of means (I-J) | standard mean error | Sig |
|---|---|---|---|---|
| visual | | | | |
| | physical | 0.96 | 0.25 | 0.000 |
| | logical | 0.72 | 0.19 | 0.000 |
| verbal | | | | |
| | physical | 0.73 | 0.22 | 0.001 |
| | logical | 0.48 | 0.16 | 0.002 |
| aural | | | | |
| | physical | 0.72 | 0.23 | 0.003 |
| | logical | 0.47 | 0.18 | 0.008 |
| physical | | | | |
| | visual | -0.96 | 0.25 | 0.000 |
| | verbal | -0.73 | 0.22 | 0.001 |
| | aural | -0.72 | 0.23 | 0.003 |
| | social | -0.83 | 0.27 | 0.002 |
| | solitary | -0.62 | 0.24 | 0.012 |
| logical | | | | |
| | visual | -0.72 | 0.19 | 0.000 |
| | verbal | -0.48 | 0.16 | 0.002 |
| | aural | -0.47 | 0.18 | 0.008 |
| | social | -0.59 | 0.22 | 0.008 |
| | solitary | -0.38 | 0.19 | 0.047 |

**According to table 3, the mean score of the academic achievement of female students (14.19) is more than the mean of male ones (13.84). Finally, the obtained F (6,170) =1.17, P=0.325>0.05 is not significant. It means that the interactive effect of learning style with gender on students' academic achievement is not significant**.

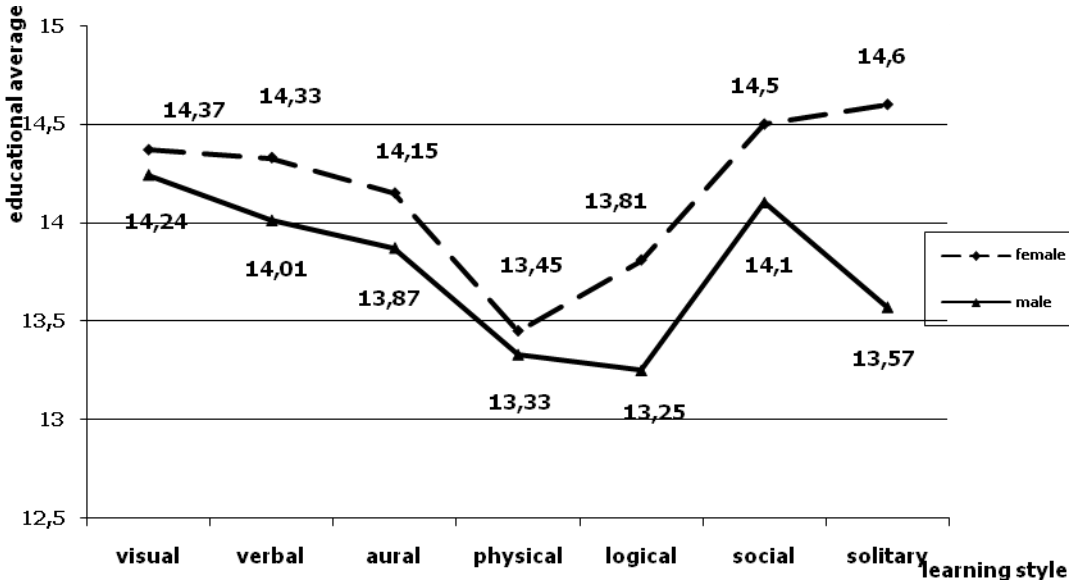


**Figure: 3**
**Interactive effect of learning styles with gender on the students' academic achievement.**

## CONCLUSION AND DISCUSSION

**Findings show that the male students of Payame Noor University use mostly verbal, solitary, social, logical, physical, aural, and visual learning styles respectively. Female students use mostly aural, verbal, visual, logical, solitary, physical, and social styles respectively. Students of Payame Noor University are expected to use solitary learning style due to the educational system (distance education) of this university, but this expectation is not fulfilled.**

**It can be because of different reasons. The first reason is that Payame Noor University doesn't use distance education in its real meaning. Students should attend the university due to different reasons such as knowing their syllabus and other educational necessities.**

**Moreover, considering social and cultural system, students feel they are a real student when they are in the paradise and classes.**

**Findings of Tekinarslan (2004) which show that students prefer to be in the university environment, findings of Murphy (1992) which show that distant learners in Turkey need social interaction, and findings of Ruzgar (2004)which show the positive attitude of distant learners towards being full time in the university admit this claim.**

**Also, because the main instruments of education are textbooks and printed materials, most of the male and female students use verbal learning style.**

**Findings also indicate that among the students of Payame Noor University those with visual learning style have the greatest academic achievement. After this group, students with social, aural, verbal, and solitary learning styles have high academic achievement respectively. Students with logical and physical styles have the least academic achievement.**

**It seems acceptable considering the educational and assessment system of this university. Of course, the interactive effect of learning style and gender on academic achievement is not significant.**

**Limitations of the questionnaire used in this research can not be ignored. This questionnaire is translated from English. Its psychological characteristics are not studied completely.**

**Only its reliability is studied and there is the possibility of error in the instruments of data collection. Moreover, the previous works done in this domain are not comparable with this research, especially considering learning styles studied in this research.**

**Therefore, there is no room for more discussion. Researchers interested in this topic can compare learning styles used by Payame Noor University students and the students of other public universities.**

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