Effects of Learning Style on Achievement of Distance Learners

Jamshed Khan[*] and Muhammad Javed Iqbal[**]

Abstract

The study aimed to find out the effect of learning style on achievement of distance learners and was delimited to the learners of Master of Education program at Allama Iqbal Open University Islamabad. The sample was selected through stratified random sampling technique. The learning style of the students was assessed using Grasha-Riechmann Student Learning Styles Scale. The study found that majority of the learners with collaborative learning style followed by participant, Independent, competitive, dependant and avoidant learning styles. It was concluded that learning styles and achievement were not correlated at p< 0.05 except a significant negative correlation between avoidant learning style and achievement score (r =0.159, p<0 .01).

Keywords: learning styles, achievement, Grasha-Reichmann, learning behaviour, distance learning

Introduction

Distance education has recently gained momentum and open universities have been established throughout the world to educate the people. With the advent of Web2.0 and facilitates like Moodle and Stream academic institutions are in transition and importance is being given to open, distance, and flexible learning throughout the world.

One of the major problems in distance education is for instructors' to adapt the adult learners' learning style. Wang[1] argued that to maximize academic achievement of adult learners, the educators must strive to provide a learner-centred and accommodative learners' learning style education. According to Garland Et al.[2] student's learning style is a major factor in achievement of the distance learner. Individual learning styles differ and play important role in the area of education.[3] Learning style is best regarded as an extension to cognitive style to distinguish learning from simple processing of information.[4]

[*] Jamshed khan, PhD Scholar, Allama Iqbal Open University Islamabad.
[**] Prof. Dr Muhammad Javed Iqbal, Director, Department of Mass Education, Sarhad University of Science and IT Peshawar.

Review of Related literature

Distance learners have diverse potential, intellectual capacities, mental faculties and experiences of life. They have their own concept of and about learning, and are self-regulated, self-directed and self-motivated to learn.[5] Post graduate distance students have different needs and motivations as compared to other students. To be successful a distance learning tutor has to consider students' personal traits and learning styles during instruction.[6]

Learning Styles

Learning styles refers to the concept that individuals differ in regard to what mode of instruction or study is most effective for them.[7] Learning styles show learners' differences and varied needs.[8] It is the way in which learners concentrate, process, and retain information. A learning style might change according to experience.[9]

Learning styles represent enduring and stable approaches to processing information.[10] Instruction requires understanding students' learning style and then teaching accordingly. Assessment of learning style requires students to evaluate the type of information they prefer and the type of mental activity that is congenial to them. Instruction is best provided in a format that matches the preferences of the learner.[11] Learning style is students inherited foundation, past life experience and demands of the environment that give emphasis to some learning abilities over the others. Learning styles are effective for refining an instructional strategy.[12]

Learning style is thus a composite of cognitive, affective and psychological factors that serve as an indicator of how learners perceive, interact with and respond to the learning environment. It reflects students' preferences and choices in a learning situation and also encompasses cognitive styles. However learning styles are not related to intelligence, mental ability or actual learning performance and no learning style is better than another. The best learning style for any student is specific to the individual and depends on students' cognitive abilities and the specific learning situation.[13] A better awareness of learning style can lead to better learning. Learning styles are not strict and a student might prefer one learning style over another. Learners might possess several learning styles and might mix them together to obtain a suitable combination for learning.

Learning styles depend on variables like learning situation and domain. An open learning environment offers various learning

objects, and it can serve more learning strategies. Understanding learning styles can facilitate communication between teachers and learners. An effective learning environment should consider the contextual and learner's characteristics. Roberts and Dyer[14] stated that the influence of learning styles on student achievement in distance education courses is inconclusive. Learning style is a preferred way of processing and maintaining information and skills and various models are proposed for its clarification. In their search for explaining differences in how learners acquired knowledge and information, learning theorists presented various learning style models and instruments for determining leaning styles of students.

Claxton and Murrell[15] reviewed numerous learning style models and classified them as (1) models related to personality, (2) models focusing on information processing, (3) models designed to measure social interaction preference, and (4) instructional preference models.

Grasha and Riechmann[16] examined the learning styles through a social, affective perspective and presented different ways learners approach the learning environment. They identified avoidant-participant, competitive-collaborative, and dependent-independent scales. The avoidant-participant scale gives a measure of learners' involvement in the learning environment and includes attitudes towards learning and reactions to the learning environment. The competitive-collaborative scale gives a measure of students' motivations in relation with other students and the nature of interaction. While the independent-dependent scale gives measures of how much structure the learner wishes and their attitude toward instructors.[17]

There are various categories and little communication and collaboration between developers of learning style models. Therefore, learning style models are diverging rather than converging to form a coherent and consistent research discipline.[18] This study attempts to investigate achievement in the context of learning styles as presented by Grasha and Reichmann and utilize the Grasha-Reichmann Learning Style Scales (GRLSS) to determine learners' styles of classroom participation. [19]

Avoidant learners are not enthusiastic about learning content and attending class. They do not participate with students and teachers and are generally uninterested in learning activities and tasks. Dependent learners demonstrate little intellectual curiosity and learn only what is required and look to teacher and peers for support and guidelines Participant learners enjoy

classrooms and its activities and are eager to do all the required and optional course requirements. Independent learners like to think for themselves and have confidence in their abilities. They prefer to learn the material that they feel is important and generally work alone on projects. Competitive learners learn course content to perform better than others and believe in getting the rewards. They want to attract attention and want recognition for their achievement. Collaborative learners feel that they can learn by sharing ideas and cooperation, and like to work with others.

Theoretical Framework

The theoretical framework for the study is based on Jung's theory of psychological and Social Interaction Model keeping in view Logan and Thomas six learning styles. Mattson, Holland and Parker[20] argue that learning may vary from individual to individual and is more heavily influenced by individual preferences than by group influences. Logan and Thomas[21] have reported the following types of student learning styles; These types are a). Competitive, b). Collaborative, c). Avoidant, d). Participant, e). Dependent and f). Independent. Learning style is a cognitive, psychological, and affective behaviour that serves as an indicator of how students perceive, and interact with learning environments. It is important to identify students learning styles to give them suitable learning opportunities and to improve their motivation and learning.[22]

Warn[23] reported no significant association between the students' learning style and academic performance. Similarly Erton[24] found a statistically low relationship between learners' learning styles, and the way they reflect these characteristics into success in learning a foreign language. While Rakap[25] found that learning styles of adult students had significant effects on their knowledge acquisition.

Campbell and Johnstone[26] reported no significant difference between the results of learners with different learning styles but a difference was found along Kolb's concrete-abstract axis. Jilardi, Damavandi, Mahyuddin, Elias, Daud, and Shabani[27] reported significant difference in the academic achievement of the Iranian students that correspond to the four learning styles; especially the mean scores for the converging and assimilating groups were significantly higher than mean scores for diverging and accommodating groups. While Abidin, Rezaee, Abdullah, and Singh[28] reported a significant relationship between achievement and learning styles. They found that the high, moderate and low achievers had a similar preference pattern of learning in all

learning styles and that the learning styles framework does not change with subjects and plays important role across all the subjects.

Wahidar[29] found a positive and significant relationship between independent, dependant, collaborative, competitive, contributive, and avoidant on students' achievement. Collaborative was the dominant factor that influenced the academic achievement of students. Wilson[30] on the other hand, found no significant correlation between learning styles influence on the educational process and the academic achievement of elementary school students. On the contrary, Barzegar[31] found no significant relationship between the learning style and the student's academic achievement. Similarly, Khalid et al.[32] also found no significant relationship between learning styles and academic achievements but reported that students preferred the dependent learning style.

Komarraju et al.[33] found that both personality traits and learning styles contributed to academic performance and that the relationship between openness and achievement was mediated by reflective learning styles. It was suggested that intellectual curiosity increases performance when students combine it with thoughtful information processing. Yi et al.[34] reported that participants' preferred learning styles had significant influence on students' achievement. Lynn[35] reported no significant differences in the final laboratory grade for learning style.

It can be concluded from the review above that the influence of learning styles on achievement is mixed and the effects of learning styles are inconclusive in a distance-learning environment. Many students are adept at learning in different ways and may be accustomed to learning in a manner that is inconsistent with their learning style. It should be noted that the social environment and other social factors like individuals, groups and organizations are likely to influence students' beliefs, attitudes and behaviours that might influence their learning styles.

Objectives of the Study
Keeping in view the theoretical framework adopted and the review of related literature about understanding the relationship between learning style and achievement. This study aims to
   i).   Determine the learning style of distance learners.
   ii). Understand the preferred learning style of distant learners in Pakistan.
   iii). Find the relationship between learning style and achievement of distance learners.

Hypotheses of the Study
Following was the hypothesis of the study.

H_o There is no significance relationship between learning styles and achievement of distance learners.

H_1 There is a significant relationship between learning styles and achievement of distance learners.

Methodology
It was a correlational research that involved collecting data in order to determine whether and to what degree a relationship existed between two or more variables. The research tools were administered personally as well as through self-addressed stamp paid envelops. The result of M.Ed students for semester spring 2012 were obtained from Controller of Examinations Allama Iqbal Open University Islamabad.

Population
The target population for this study was M.Ed students of Allama Iqbal Open University enrolled in semester spring 2012. As the population in spring 2012 was 3529 in the four core courses taught in M.Ed program namely Foundation of Education (Course code 831), Educational Research (Course code 837), Curriculum Development and Instruction (Course code 838), and Educational Psychology (Course code 840).

Sample
Stratified random sampling procedure was adopted focusing on two districts from each province. There were 8 districts Rawalpindi, Dera Ghazi Khan, Karachi, Sujawal Tattha, Abbotabad, Swat, Quetta, Kallat from 4 provinces. Literacy was the main indicator to sample these districts besides sub indicators male/female. These districts were taken on the basis of highest and lowest literacy rate. M.Ed students of both male and female were taken as sample from each district of highest and lowest rate of literacy.

As total number of students in these courses was 3529, and according to Gay[36] for a population of 4000 appropriate sample size is 351, therefore, the same number of 351 students was selected as sample for the purpose of study.

Table 1: Showing province and district wise sample

Province	District	Total population	Sample selected

1	Punjab	Rawalpindi	1175	117
		Dera Ghazi Khan	1093	109
2	Sindh	Karachi	112	11
		Thatta	60	06
3	Khyber Pakhtunkhwa	Abbotabad	497	49
		Swat	414	41
4	Baluchistan	Quetta	106	11
		Kallat	72	07
	Total		3529	351

Instrumentation

There are more than 30 instruments used by researchers to assess different dimensions of learning style. The researcher used the scale under the provision of the Copy Right Law of the United States of America and the related laws contained in the title 17 of the United States code.   The inventory was adapted for use in Pakistani context. The scale measured the following types of learning styles:

i) Independent ii) Avoidant iii) Collaborative iv) Dependent
v) Competitive vi) Participant

Grasha-Riechmann[37] student learning style scale used a five-point Likert scale which was coded as follows: Strongly Agree = 5, Agree = 4, Undecided = 3,   Disagree   =   2,   and   Strongly Disagree = 1. Student achievement scores were acquired from the Controller of Examination, AIOU Islamabad.

Table 2: Cronbach's alpha of the instrument of learning style

		Mean	Std. Deviation	Skewness	Alpha
1	Independent	39.550	5.0887	-.720	0.709
2	Avoidant	28.325	6.7497	-.114	0.723
3	Collaborative	43.675	4.0471	-.137	0.717
4	Dependent	38.475	5.7601	-.509	0.706
5	Competitive	40.025	5.3132	-.494	0.709
6	Participant	40.525	5.0332	-.460	0.723
	Learning Style Scale	230.575	19.1310	-.236	0.844

The instruments were administered under postal certificate (UPC) containing a self-addressed and properly stamped envelopes. Out of 351 questionnaires sent, the researchers received back 283 which were used as data.

Analysis and Interpretation of Data

Descriptive statistics like Mean, Standard deviation, and Pearson Product Movement Coefficient of Correlation, and regression were used for analysis and interpretation of data.

Table 3: Descriptive statistics of various learning styles

		Mean	Std. Deviation	Skewness	Rank
1	Independent	40.29	4.61	-0.78	3
2	Avoidant	27.40	5.92	0.32	6
3	Collaborative	43.27	3.77	-0.26	1
4	Dependent	37.81	4.66	-0.25	5
5	Competitive	39.11	4.64	-0.07	4
6	Participant	40.67	3.99	-0.46	2

Table 3 presents description of various learning styles. It shows that majority of students had Collaborative Learning Style (M=43.27,SD=3.77, Rank=1) followed by Participant Learning Style (M=40.67, SD=3.99, Rank=2). Independent Learning was ranked 03 with Mean of 40.29, SD of 4.61. It was followed by Competitive Learning Style (M=39.11, SD=4.64, Rank=4), Dependant Learning Style (M=37.81, SD=13.66, Rank=5), while Avoidant Learning Style was ranked 6 with Mean score of 27.40 and Standard deviation of 5.93.

Table 4: Relationship between learning style and achievement

		Mean Score	SD	1	2	3	4	5	6	7
1	Avg_Score	61.63	9.71	1	-.048	-.159**	-.067	-.104	-.082	.010
2	Independent	40.29	4.61			-.022	.047	.093	.188**	.235**
3	Avoidant	27.40	5.92				-.151*	.228**	.173**	-.157**
4	Collaborative	43.27	3.77					.356**	.486**	.175**
5	Dependent	37.81	4.66						.473**	.418**
6	Competitive	39.11	4.64							.406**
7	Participant	40.67	3.99							

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

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

The bivariate results, presented in table 4, indicated that learning styles and achievement were not correlated at $p<0.05$ except a significant negative correlation between avoidant learning style and achievement score (r =0.159, p<0 .01).

The Table 4 shows that Independent learning style was positively and significantly correlated with competitive learning style (r=0.188, p<0.01). Similarly the independent learning style

was also highly and positively correlated with participant learning style (r=0.235, P<0.01). Avoidant learning style was also negatively correlated with collaborative learning style (r=-0.151, p<0.05) and participant learning style (r=-0.157, p<0.01), but was positively correlated with dependent learning style (r=0.228, p<0.01) and competitive learning style (r=0.173, p<0.01). Collaborative learning style was also significantly correlated with dependent learning style (r=0.356, p<0.01), competitive learning style (r=0.486,p<0.01), and also participant learning style (r=0.175, p<0.01). Dependent learning style was also highly correlated with competitive learning style (r=0.473, p<0.01) and participant learning style (r=0.418, p<0.01). Competitive learning style was also correlated with participant learning style (r=0.406, p<0.01).

Regression Analysis
Regression analysis was carried out using achievement scores as dependant variable and various learning styles components as predictors.

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.232[a]	.054	.015	9.63239

a. Predictors: (Constant), T_GS, T_LTI, Competitive, Independent, T_LLI, Avoidant, T_LCI, Dependent, Collaborative, Participant, T_LII

Model summary gave the measures of how well our overall model, i.e. the predictors are able to predict achievement. R Square gives the amount of variance in achievement explained by the predictor variables together. The model summary showed that value of Adjusted R square was 0.015, which suggested that the predictors were particularly not good at predicting achievement.

Table 6: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1430.733	11	130.067	1.402	.172[b]
	Residual	25144.180	271	92.783		
	Total	26574.913	282			

a. Dependent Variable: Avg_Score

b. Predictors: (Constant), General satisfaction, Learner-technology interaction, Competitive, Independent, Learner-learner interaction, Avoidant, Learner content interaction, Dependent, Collaborative,

Participant, Learner-instructor interaction

Table 6 showed that F-test value was 1.402 which was not significant at p<0.05.

Table 7: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	84.37	11.114		7.592	.000
	Independent	-.124	.133	-.059	-.933	.352
	Avoidant	-.331	.122	-.202	-2.706	.007
	Collaborative	-.180	.205	-.070	-.877	.381
	Dependent	-.024	.168	-.011	-.143	.887
	Competitive	.031	.173	.015	.182	.856
	Participant	.146	.200	.060	.728	.467

Table 7 showed that avoidant learning style is statistically negatively significant predictor of achievement (β = -0.202, $p < 0.01$), followed by learner instructor interaction which had some negative relationship that was not statistically significant (β = -0.110, $p < 0.05$).

Based on the analysis above it can be concluded that collaborative learning style was predominant learning style among distance learners followed by participant learning style, independent learning, followed by competitive learning style, dependant learning style, while the avoidant learning style was the least favoured learning style among distance learners. It is also concluded that learning styles and achievement were not correlated at p< 0.05 while Avoidant learning style negatively impacted achievement of learners (r =0.16, p<0 .01).

Discussion and Conclusion
As no particular learning style was not predominantly affecting learners' performance; therefore, attempts should be made to accommodate multiple learning styles of students. It appears that learning styles alone do not guarantee better student achievement. Age, educational level, and motivation influence learning and that may also contribute to change in learning style. Teachers should understand learning styles and relate them to their own context. Analysing learning styles can be beneficial to students and might help them focus on learning, thus increasing educational outcomes and satisfaction.

Teachers can incorporate learning styles in their teaching practices and methods by identifying the learning styles of students, matching their own teaching style to students' learning style, and helping students in developing proper learning-styles. Distance education programs can be designed keeping in view various characteristics that predict better performance and the context of distance learning environments.

An individual's learning style is influenced by social influences, internal psychological processes: and other individual factors. It is not hypothesized that these factors are causally related but that it is useful to consider how they might influence learning styles and achievement of distance learners. It is important that students are given multiple learning opportunities. Accommodating teaching to learning styles might improve learner satisfaction, retention, and overall performance by increasing motivation and efficiency, and developing a positive learning attitude.

The study recommends that as avoidant learning style was negatively correlated with achievement, therefore, steps should be taken to develop proper learning styles in distance learners which cope with their profile. It is also recommended that learners might be encouraged to increase interaction with other learners and with technology.

Notes and References

[1] Victor Wang, "*Distance Education And Learning Style"*. IGI Global, Retrieved from: http://www.igi-global.com/viewtitlesample.aspx?id=16711

[2] Diana Garland and Barbara N. Martin, "Do gender and learning style play a role in how online courses should be designed", *Journal of Interactive Online Learning* 4, no. 2 (2005): 67-81.

[3] Naser-Nick Manochehr, "The influence of learning styles on learners in e-learning environments: An empirical study", *Computers in Higher Education Economics Review* 18, no. 1 (2006): 10-14.

[4] Kit Logan and Pete Thomas, "Learning styles in distance education students learning to program". In *Proceedings of 14th workshop of the psychology of programming interest group, Brunel University*, (2002): 29-44.

[5] Muhammad Rashid, *Study Guide: The Concept and Methods of Distance Education*, (Islamabad: AIOU, 2000).

[6] Irshad Hussain, "A Study of Learners' Reflection on Andragogical Skills of Distance Education Tutors", *Online Submission* 6, no. 1 (2013): 123-138.

[7] Harold Pashler, Mark McDaniel, Doug Rohrer and Robert Bjork, "Learning styles concepts and evidence", *Psychological science in the Public Interest* 9, no. 3 (2008): 105-119.

[8] Mohamad Jafre Zainol Abidin, Abbas Ali Rezaee, Hellen Nor Abdullah, and Kiranjit Kaur Balbir Singh "Learning styles and overall academic achievement in a specific educational system", *International Journal of Humanities and Social Science* 1, no. 10 (2011): 143-152.

[9] Too Shaw Warn, "Students' learning style and their academic achievement for Taxation course–A comparison study". In *Proceedings Of The 2nd International Conference Of Teaching And Learning (ICTL 2009). INTI University College, Malaysia*. 2009.

[10] Rebecca Finley Snyder, "The relationship between learning styles/multiple intelligences and academic achievement of high school students", *The High School Journal* 83, no. 2 (1999): 11-20.

[11] Harold Pashler, et.al, "Learning styles concepts and evidence", op. cit., 109.

[12] M. David Merrill, "Instructional transaction theory (ITT): Instructional design based on knowledge objects". In Reigeluth, M. Charles, ed. *Instructional-design theories and models: A new paradigm of instructional theory*, Vol. 2 (n.p.: Routledge, 1999), 397-424.

[13] Kit Logan and Pete Thomas, "Learning styles in distance education students learning to program", op. cit.

[14] T. Grady Roberts and James E. Dyer, "The influence of learning styles on student attitudes and achievement when an illustrated web lecture is used in an online learning environment", *Journal of Agricultural Education* 46, no. 2 (2005): 1-11.

[15] Charles S. Claxton and Patricia H. Murrell, *Learning Styles: Implications for Improving Educational Practices. ASHE-ERIC Higher Education Report No. 4, 1987*. Association for the Study of Higher Education, 1 Dupont Circle, Suite 630, Washington, DC 20036, 1987.

[16] Sheryl Wetter Riechmann, Anthony F. Grasha, "A rational approach to developing and assessing the construct validity of a student learning style scales instrument", *The Journal of Psychology* 87, no. 2 (1974): 213-223.

[17] Stacey Lynn Rimmerman, "Personality Types and Learning Styles: An Investigation of Their Influence on Performance in a Distance Education Environment" (PhD diss., The University of West Florida, 2005).

[18] Erica Melis and Rachada Monthienvichienchai, "They call it learning style but it's so much more". In *World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education*. 2004.

[19] Sheryl Wetter Riechmann and Anthony F. Grasha, "A rational approach to developing and assessing the construct validity of a student learning style scales instrument", *The Journal of Psychology* 87, no. 2 (1974): 213-223.

[20] Douglas J. Mattson, Clarence C. Holland and Karen L. Parker, "Learning Style Diversity in Post–Secondary Distance Education", *Christian Perspectives in Education* 1, no. 2 (2008): 3.

[21] Kit Logan and Pete Thomas, "Learning styles in distance education students learning to program", op. cit.

[22] Salih Rakap, "Impacts of learning styles and computer skills on adult students' learning online", *TOJET: The Turkish Online Journal of Educational Technology* 9, no. 2 (2010).

[23] Too Shaw Warn, "Students' learning style and their academic achievement for Taxation course–A comparison study", op. cit.

[24] Ismail Erton, "Relations between personality traits, language learning styles and success in foreign language achievement", *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi* 38, no. 38 (2010).

[25] Salih Rakap, "Impacts of learning styles and computer skills on adult students' learning online", op. cit.

[26] Vivian Campbell and Michael Johnstone, "The significance of learning style with respect to achievement in first year programming students". In *2010 21st Australian Software Engineering Conference*, IEEE, (2010): 165-170.

[27] Alireza Jilardi Damavandi, Rahil Mahyuddin, Habibah Elias, Shafee Mohd Daud, and Jafar Shabani, "Academic achievement of students with different learning styles", *International Journal of Psychological Studies* 3, no. 2 (2011): 186.

[28] Mohamad Jafre Zainol Abidin, et. al, "Learning styles and overall academic achievement in a specific educational system", op. cit.

[29] Maizatul Wahidar and Mohd Roslan, "The Influence of Students' Learning Styles on Academic Achievements" (PhD diss., Universiti Utara Malaysia, 2011). Retrieved January 30, 2014 from http://etd.uum.edu.my/2687/2/1.Maizatul_Wahidar_Mohd_Roslan.pdf

[30] Mary Wilson, "Students' Learning Style Preferences and Teachers' Instructional Strategies: Correlations between Matched Styles and Academic Achievement", *SRATE Journal* 22, no. 1 (2012): 36-44.

[31] Majid Barzegar, "The relationship between learning style, locus of control and academic achievement in Iranian students". In *Proceedings of the 2011 2nd International Conference on Education and Management Technology* (2011): 13-195.

[32] Rozalina Khalid, Ahmad Azman Mokhtar, Mohd Sofian Omar-Fauzee, Abd Latif Kasim, Yahya Don, Nurul Fatni Abdussyukur, Fatin Azreen Ponajan, "The Learning Styles and Academic Achievements among Arts and Science Streams Student", *International Journal of Academic Research in Progressive Education and Development* 2, no 2 (2013): 68-85.

[33] Meera Komarraju, Steven J. Karau, Ronald R. Schmeck, and Alen Avdic, "The Big Five personality traits, learning styles, and academic achievement", *Personality and individual differences* 51, no. 4 (2011): 472-477.

[34] Wei Chooi Yi, H. W. Hui, and S. Jasmine, "Relationship between learning styles and Content Based Academic Achievement among Tertiary Level Students". In *The Enhancing Learning: Teaching and Learning Conference*. 2011.

[35] Lynn Worley-Davis, "A Comparison of Learning Styles and Academic Performance of Students Enrolled in Introductory Poultry Science Courses in Bachelors of Science and Associates of Applied Science Programs" (Master diss, North Carolina State University, 2011).

[36] Lorraine R. Gay. *Educational research; competencies for analysis and application,* (fifth edition) (Islamabad: National Book Foundation, 2000).

[37] Sheryl Wetter Riechmann, Anthony F. Grasha, "A rational approach to developing and assessing the construct validity of a student learning style scales instrument", op. cit.