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Effect of Teaching through Visuals in History on the Achievement of 9th Grade Students in Relation to Self Efficacy

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ABSTRACT

The present study investigates the effect of teaching through visuals in history on the achievement of 9th grade students in relation to self-efficacy. The sample of 100 students of 9th class taken from two different Govt. Schools of SBS Nagar, affiliated to Punjab School Education Board, SAS Nagar, Punjab. Instructional material based on teaching through visuals approach were prepared and implemented to the experimental group after pre-testing. The gain scores were computed after post- test for all the students. Achievement test and self-efficacy scale were also administered. The data was analyzed statistically with the help of mean, SD and analytical variance. A two way (2×3) Analysis of Variance was used to arrive at the following conclusions: (i) Teaching through visuals approach group was found significantly better on achievement in history than that of control group. (ii) Significant difference was found in the Achievement in history scores of students with regard to their self-efficacy, (iii) Significant interaction effect was found between instructional approaches and self-efficacy on the achievement in history scores of experimental and control group.

1. Introduction

History is the study of modification and development in society over time. The study of history permits us to know how past human action affects the present and influences our future, and it permits us to evaluate these effects. So, history is concerning learning a way to suppose the past, which affects the present, in an exceedingly disciplined way. History is a process of enquiry. Given the inherent challenges in teaching and learning complex or invisible processes in history, educators have developed ways of representing these processes to enable and enhance student understanding. External visual representations, including diagrams, photographs, illustrations, flow charts, and graphs, are often used in history to both illustrate and explain concepts (Hegarty, Carpenter, & Just, 1991). Visualizations can directly represent several structural and behavioural properties. They also help to draw inferences (Larkin & Simon, 1987), find routes in maps (Levine, 1982), spot trends in graphs (Kessell & Tversky, 2011), imagine traffic flow or seasonal changes in light from architectural sketches (Tversky & Suwa, 2009), and determine the consequences of movements of gears and pulleys in mechanical systems (Hegarty & Just, 1993; Hegarty, Kriz, & Cate, 2003).

Thomas and Keinders (2010) stressed the fact that the use of visuals 'help the teacher to clarify, establish, correlate and coordinate accurate concepts, interpretations and appreciations, and enable him to make learning additional concrete, effective, interesting, inspirational, meaningful and vivid'. Bamford (2018) advises the teachers to take into consideration the fact that visual literacy is the best way "to obtain information, construct knowledge and build successful educational outcomes". The important elements of visual teaching in the history class are black-board, charts and maps, pictures, flannel board, films etc. To make the learning in the subject of history effective visuals are the best alternates.

Achievement is the degree to which student is benefitting from directions in a given zone of learning (Crow & Crow, 1956). Achievement is one which can set up whether a student has a charge of the material which instructors have educated (Cronbach, 1984). An achievement test is one which evaluates the information of some school subjects. What a man has accomplished in the past is normally a significant decent marker of his future capacity (Aiken, 1985). Torres (1993) characterized achievement as the achieved capacity or level of capability in school undertakings for the most part as estimated by state administered tests and communicated in age as review units in light of standards got from as wide examining of students' execution. It is the result of general and particular learning encounters. Accordingly achievement implies the achievement level at which the student's working in school undertakings, for sample, english, history, sociology, mathematics and so forth is figured through examination. It is the result of instruction the degree to which a student, educator, or organization has accomplished their instructive objectives.

Bandura's (1986), defined self efficacy as "an individual's belief in his or her own ability to organize and implement action to produce the desired achievements and results" (Bandura, 1997). Prior studies have provided robust proof that self-efficacy is a positive predictor of performance outcomes in numerous subjects (Schunk, Pintrich & Meece, 2008; Usher & Pajares, 2008). Usher and Pajares (2008) argued that self-efficacy "predicts students' academic achievement across academic areas and levels." Bandura's (1977) self-efficacy is one of the individual factors and is cleared as ,the conviction that one can successfully execute the behaviour needed to produce the outcomes. self-efficacy plays a vital role in persons' performances, it influences memory indirectly (Bandura, 1997, 1986; Multon, Brown & Lent, 1991).

2. Need and Significance of the Study

As we all know that the educational field is being developing and transforming very quickly now a days. Still,

today our teaching strategies especially in the subject of history and other social sciences remain the same. New teaching strategies must be developed by the teachers and educationists. After going through the detailed educational review of related literature and studying various strategies of teaching it is observed that students learn better when they are directly observing the phenomenon or by seeing the events through visual aids. So the need was felt to verify various visual teaching techniques to develop the concepts of students in the subject of history. The present study being an effort to assess the extent to which visual teaching instructions can replace the conventional method of teaching in history. Teaching of history through visual teaching may improve performance in history of 9^{th} class student's. So the investigator proposed to study the effect of teaching through visuals on the achievement in history.

3. Objectives

1. To study the significance of difference in the mean gain achievement scores in history of experimental and control group.
2. To study the significance of difference in the gain mean gain achievement scores in history of students with high, average and low self-efficacy.
3. To study the significant interaction effect between the instructional strategy and self efficacy with regard to achievement in history.

4. Hypotheses

H_1: There exists no significant difference in the achievement in history of 9^{th} class students taught through visual learning approach and conventional teaching approach.

H_2: There exists no significant difference in the achievement in history of 9^{th} class students with high, average and low self-efficacy.

H_3: There exists no significant interaction between instructional approach and self efficacy with regard to achievement in history.

5. Sample

The study was conducted on a random sample of 100 students of 9^{th} class. 54 students were taken from Government High School, Sheikhpur, SBS Nagar (Pb) and 46 students from Government High School, Mirpur Jattan, SBS Nagar(Pb). It was random and purposive sample. The study was conducted on two intact groups viz. one is experimental group and other is control group in each school. The experimental group was taught through visual learning approach and control group was taught through conventional teaching approach. The two schools were randomly selected from the total school of SBS Nagar.

6. Design

In order to analyze the data (2×3) Analysis of Variance was used. Experimental group was taught through visual learning approach and the control group was taught through conventional teaching approach. The study covers two independent variables viz. instructional approach and self-efficacy. The variables of instructional approach were studied at two levels i. e. teaching through visuals approach and conventional teaching approach. The variable self-efficacy was also studied at three levels i. e. high, average and low self efficacy group. These variables were work as independent variables. The main dependent variable was achievement in history which was calculated as the difference in pre-test and post-test scores in the test.

7. Tools used

1. An Achievement Test in History was prepared by the investigators.
2. 10 lesson plan based on teaching through visuals (Geographical Features and effect, Shri Guru Nanak Dev Ji, Development of Sikh Religion (1539 to 1581), Shri Guru Arjun Dev Ji:- Their Martyrdom and contribution in the development of Sikh religion, Shri Guru Nanak Dev Ji and Contemporary Society, French Revolution, Russion Revolution, Forest Society and Colonism, Shri Guru Arjan Dev Ji and Social History of dressing)were prepare by the investigators to conduct the experiment.
3. Self-Efficacy scale by Mathur and Bhatnagar (2012) was used to classify the students into high, average and low self-efficacy.

8. Procedure

After the selection of the sample and allocation of students to the two instructional strategies, the experiment was conducted in four phases. Firstly, the investigator set a meeting with the principals of selected schools for the experiment. Secondly, the pre test of achievement in history was administered on the total sample. After that, self-efficacy scale was administered in each school for classification of the students. The answer sheets were scored as per the scoring key to obtain the scores of students on the variables. Thirdly, treatment was given to the experimental group. The experimental group was taught through visuals learning approach and control group was taught by conventional teaching approach. Fourthly, after the completion of the experiment, the achievement in history post- test was administered to the students of both the groups. The answer-sheets were scored with the help of scoring key.

9. Analysis and Interpretation of the Results

Analysis of Descriptive Statistics

The data were analyzed to determine the nature of the distribution of scores by employing mean and standard deviation. The two way analysis of variance was used to test the hypotheses related to approaches of teaching and self-efficacy level of students. The mean and standard deviation of different sub groups have been presented in table- 1.

Table 1: A summary of descriptive statistics of obtained gain scores on achievement in history

Variable	Experimental Group			Control Group			Total		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
High Self-Efficacy	14	8.42	2.68	14	3.00	1.24	28	5.71	1.89
Average Self-Efficacy	22	4.63	2.03	22	2.45	1.79	44	3.54	1.95
Low Self-Efficacy	14	4.64	1.15	14	2.14	1.02	28	3.39	1.21
Total	50	5.70	2.64	50	2.52	1.47	N=100		

Source: Field Study 2019

It may be observed from the table-1 that the mean scores of teaching through visuals learning approach (M=5.70) is higher than the conventional teaching approach (M=2.52). This shows that teaching through visuals learning approach is more effective than the conventional teaching approach. It is also confirmed that the gain mean achievement scores of the three groups i.e. high, average and low self-efficacy group is 5.71, 3.54 and 3.39 respectively differ significantly. It is further concluded that the gain mean achievement scores with teaching through visuals learning approach has shown significant differences for high, average and low self-efficacy groups.

Analysis of Variance on the gain Achievement scores in history

The mean of different sub-groups, sum of squares, degree of freedom, mean sum of squares and the F - ratio have been presented in table -2

Table -2: Summary of Analysis of Variance (2×3) Factorial Designs

Sources of Variance	Df	Sum of Square	Mean Sum of Square	F-ratio
Teaching Through Visuals (A)	1	271.41	271.41	85.35**
Self-Efficacy (B)	2	100.48	50.24	15.80**
Interaction (A×B)	2	49.58	24.79	7.79**
Error	94	298.903	3.18	

**Significance at the 0.05 level, **Significance at the 0.01 level*
(Critical value 3.945 at 0.05 level and critical value 6.91 at 0.01 level, df 1/94)
(Critical value 3.094 at 0.05 level and critical value 4.83 at 0.01 level, df 2/94)

Teaching through Visuals (A)

It is observed from the table -2 that the F-ratio for difference in mean gain scores of teaching through visuals approach and conventional teaching approach group is 85.35, which in comparison to the table value was found significant at 0.01 level of significance. Hence, the hypothesis H_1: There exists no significant difference in the achievement in history of 9^{th} class students taught through visual learning approach and conventional teaching approach, is rejected. Thus result indicates that achievement in history of experimental group was higher than that of control group learners. The findings of the study were supported by the findings of Punzalan (2018), DeSousa; Richter and Nel (2017), Bobek and Tversky (2016), Shabiralyani, Hasan, Hamad and Iqbal (2015), Evagorou, Erduran and Mäntylä (2015), Al-Mamun (2014) and Rasul, Bukhsh and Batoolc (2011) found that teaching through various visuals techniques proved effective for the enhancement of knowledge, achieving in various subjects and skills. To probe deeper F-ratio was followed by t-test. The value of t-ratio for experimental and control group have been placed in table-3.

Table-3: t-ratio for various combinations of different methods of instructions

Variables			Experimental Group			Control Group		
			N	Mean	SD	N	Mean	SD
			50	5.70	2.64	50	2.52	1.47
Experimental Group								
N	Mean	SD		--------			7.42**	
50	5.70	2.64						
Control Group								
N	Mean	SD		--------			--------	
50	2.52	1.47						

*** Significant at 0.01 level*
(Critical value 2.63 at 0.01 level, df 98)

Table 3, shows that mean gain achievement scores of experimental group taught through visuals is 5.70, which were comparatively more than the mean gain achievement scores of 2.52 of control group taught through conventional teaching approach. The t-ratio for difference in mean gain achievement scores of experimental group and control group is 7.42, which in comparison to table value ($t_{0.01}$=2.63, df=98) was found significant at 0.01 level of significance. Thus learners of

experimental group performed better in history than that of control group.

Self-Efficacy (B)

Table 2, shows that F-ratio for the difference between means of groups with high, average and low self-efficacy, on the gain achievement scores in history was 15.80 found to be significance at the 0.01 level of significance. Thus, the data provided sufficient evidence to reject the hypothesis **H_2**: "There exists no significant difference in the achievement in history of 9^{th} class students with high, average and low self-efficacy", is rejected Thus the result indicates that the mean gain achievement scores of high self-efficacy group was found higher than that of average and low self-efficacy group. Results of the present findings were supported by the findings of Tiyuri, Saberi, Miri, Shahrestanaki, Bayat and Salehiniya (2018), van Rooij, Jansen, and van de Grift (2017), Meera and Jumana (2015) and deFátima Goulão (2014) found that there exist significant effect of self efficacy of students on their achievements and contradicted by the findings of Rymer (2017) found that there exist no significant difference in the achievement with regard to self efficacy. To investigate further, F-ratio is followed by t-test. The values of t-ratio for different combinations have been given the following table-4.

Table-4: t-ratio for different self-efficacy groups on gain achievement scores in history

Variables	High Self-Efficacy	Average Self-Efficacy	Low Self-Efficacy
	N Mean SD	N Mean SD	N Mean SD
	28 5.71 3.44	44 3.54 2.19	28 3.39 1.66
High Self-Efficacy N Mean SD 28 5.71 3.44	-------	3.27**	3.21**
Average Self-Efficacy N Mean SD 44 3.54 2.19	-------	--------	0.315
Low Self-Efficacy N Mean SD 28 3.39 1.66	---------	-------	

Significant at 0.05 level* * Significant at 0.01 level*

(Critical value 2.00 at 0.05 level and 2.65 at 0.01 level, df 70)

(Critical value 2.005 at 0.05 level and 2.685 at 0.01 level, df 54)

The table 4 shows that mean gain achievement scores of high self-efficacy group was 5.71, which is comparatively more than the mean gain achievement scores of 3.54 of average self-efficacy group. The t-ratio for difference in mean gain achievement scores of high self-efficacy group and average self-efficacy group is 3.27, which in comparison to table value ($t_{0.01}$=2.685, df=54) was found significant at 0.01 level of significance. Thus high self-efficacy group performed better in history than that of average self-efficacy group.

The table 4 shows that mean gain achievement scores of high self-efficacy group was 5.71, which is comparatively more than the mean gain achievement scores of 3.39 of low self-efficacy group. The t-ratio for difference in mean gain scores of high self-efficacy group and low self-efficacy group is 3.21, which in comparison to table value ($t_{0.01}$=2.685, df=54) was found significant at 0.01 level of significance. Thus high self-efficacy group performed better in history than that of low self-efficacy group.

Teaching Through Visuals and Self-Efficacy (A×B)

Table 2, shows that F-ratio for the interaction between teaching through visuals and self-efficacy of students on the gain achievement scores in history was 7.79 which in comparison to the table value was found significant at the 0.01 level of significance. Thus the data provided sufficient evidence to reject the hypothesis **H_3:** "There exists no significant interaction between instructional approach and self efficacy with regard to achievement in history" was rejected. It is concluded that there is significant difference in gain achievement scores in history due to interaction effect between method of instructions and self-efficacy of the students. To find out the inter difference between various sub groups, due to which interaction is found to be significant, t-ratios are computed and are presented below in the table 5.

Table 5: Showing t-ratio of means of sub-groups of methods of instruction and self-efficacy

Variables		Experimental Group			Control Group		
		High Self-Efficacy N M SD 14 8.42 2.62	Average Self-efficacy N M SD 22 4.63 2.03	Low Self-Efficacy N M SD 14 4.64 1.15	High Self-Efficacy N M SD 14 3.00 1.24	Average Self-efficacy N M SD 22 2.45 1.79	Low Self-Efficacy N M SD 14 2.14 1.02
Experimental Group	High Self-Efficacy N M SD 14 8.42 2.62	--	4.81**	4.85**	6.87**	8.033**	8.19**
	Average Self-Efficacy N M SD 22 4.63 2.03	----	----	0.011	2.69*	3.77**	4.23**
	Low Self-Efficacy N M SD 14 4.64 1.15	----	----	----	3.63**	4.05**	6.06**
Control Group	High Self-Efficacy N M SD 14 3.00 1.24	----	----	----	---	0.99	2.09*
	Average Self-Efficacy N M SD 22 2.45 1.79	----	----	----	----	---	0.59
	Low Self-Efficacy N M SD 14 2.14 1.02	----	----	----	---	---	---

**Significance at 0.05 level* ***Significant at 0.01 level*

Table 5 indicates that high self-efficacy group with mean of 8.42 exhibits higher mean gain achievement scores than average self-efficacy group with mean 4.63 of experimental group. The t-ratio for difference in mean gain achievement scores of high and average self-efficacy of experimental group was 4.81, which in comparison to table value ($t_{0.01}$=2.72, df 34) was found significant at 0.01 level of significance. The result indicates that high self-efficacy group of experimental group performed better in history than that of average self-efficacy group of experimental group.

Table 5 indicates that high self-efficacy group with mean of 8.42 exhibits higher mean gain achievement scores than low self-efficacy group with mean 4.64 of experimental group. The t-ratio for difference in mean gain achievement scores of high and average self-efficacy of experimental group was 4.85, which in comparison to table value ($t_{0.01}$=2.78, df 26) was found significant at 0.01 level of significance. The result indicates that high self-efficacy group of experimental group performed better in history than that of low self-efficacy group of experimental group.

Table 5 indicates that high self-efficacy group with mean of 8.42 of experimental group exhibits higher mean gain achievement scores than high self-efficacy group with mean 3.00 of control group. The t-ratio for difference in mean gain achievement scores of high self-efficacy of experimental group and control group was 6.87, which in comparison to table value ($t_{0.01}$=2.78, df 26) was found significant at 0.01 level of significance. The result indicates that high self-efficacy group of experimental group performed better in history than that of high self-efficacy group of control group.

Table 5 indicates that high self-efficacy group with mean of 8.42 of experimental group exhibits higher mean gain achievement scores than average self-efficacy group with mean 2.45 of control group. The t-ratio for difference in mean gain scores of high self-efficacy of experimental group and average self-efficacy group of control group was 8.033, which in comparison to table value ($t_{0.01}$=2.72, df 34) was found significant at 0.01 level of significance. The result indicates that high self-efficacy group of experimental group performed better in history than that of average self-efficacy group of control group.

Table 5 indicates that high self-efficacy group with mean of 8.42 of experimental group exhibits higher mean gain achievement scores than low self-efficacy group with mean 2.14 of control group. The t-ratio for difference in mean gain achievement scores of high self-efficacy group of experimental group and low self-efficacy group of control group was 8.19, which in comparison to table value ($t_{0.01}$=2.78, df 26) was found significant at 0.01 level of significance. The result indicates that high self-efficacy group of experimental group performed better in history than that of low self-efficacy group of control group.

Table 5 indicates that average self-efficacy group with mean of 4.63 of experimental group exhibits higher mean gain achievement scores than high self-efficacy group with mean 3.00 of control group. The t-ratio for difference in mean gain achievement scores of high self-efficacy of experimental group and control group was 2.69, which in comparison to table value ($t_{0.05}$=2.06, df 26) was found significant at 0.05 level of significance. The result indicates that average self-efficacy

group of experimental group performed better in history than that of high self-efficacy group of control group.

Table 5 indicates that average self-efficacy group with mean of 4.63 of experimental group exhibits higher mean gain achievement scores than average self-efficacy group with mean 2.45 of control group. The t-ratio for difference in mean gain achievement scores of average self-efficacy group of experimental group and control group was 3.77, which in comparison to table value ($t_{0.01}$=2.72, df 36) was found significant at 0.01 level of significance. The result indicates that average self-efficacy group of experimental group performed better in history than that of average self-efficacy group of control group.

Table 5 indicates that average self-efficacy group with mean of 4.63 of experimental group exhibits higher mean gain achievement scores than low self-efficacy group with mean 2.14 of control group. The t-ratio for difference in mean gain achievement scores of average self-efficacy of experimental group and low self efficacy of control group was 4.23, which in comparison to table value ($t_{0.01}$=2.78, df 26) was found significant at 0.01 level of significance. The result indicates that average self-efficacy group of experimental group performed better in history than that of low self-efficacy group of control group.

Table 5 indicates that low self-efficacy group with mean of 4.64 of experimental group exhibits higher mean gain achievement scores than high self-efficacy group with mean 3.00 of control group. The t-ratio for difference in mean gain achievement scores of low self-efficacy group of experimental group and high self-efficacy of control group was 3.63, which in comparison to table value ($t_{0.01}$=2.78, df 26) was found significant at 0.01 level of significance. The result indicates that low self-efficacy group of experimental group performed better in history than that of high self-efficacy group of control group.

Table 5 indicates that low self-efficacy group with mean of 4.64 of experimental group exhibits higher mean gain achievement scores than average self-efficacy group with mean 2.45 of control group. The t-ratio for difference in mean gain achievement scores of low self-efficacy group of experimental group and average self-efficacy of control group was 4.05, which in comparison to table value ($t_{0.01}$=2.72, df 34) was found significant at 0.01 level of significance. The result indicates that low self-efficacy group of experimental group performed better in history than that of average self-efficacy group of control group.

Table 5 indicates that low self-efficacy group with mean of 4.64 of experimental group exhibits higher mean gain achievement scores than low self-efficacy group with mean 2.14 of control group. The t-ratio for difference in mean gain achievement scores of low self-efficacy group of experimental and control group was 6.06, which in comparison to table value ($t_{0.01}$=2.72, df 26) was found significant at 0.01 level of significance. The result indicates that low self-efficacy group of experimental group performed better in history than that of low self-efficacy group of control group.

Table 5 indicates that high self-efficacy group with mean of 3.00 of control group exhibits higher mean gain achievement scores than low self-efficacy group with mean 2.14 of control group. The t-ratio for difference in mean gain achievement scores of high and low self-efficacy groups of control group was 2.09, which in comparison to table value ($t_{0.05}$=2.06, df 26) was found significant at 0.05 level of significance. The result indicates that high self-efficacy group of control group performed better in history than that of low self-efficacy group of control group.

10. Findings

1. The learners of experimental group taught through visuals learning approach gain high scores in history than that of control group taught through conventional teaching approach.
2. The two instructional treatments yield significant difference in achievement in history mean gain scores of learners with high, average and low self efficacy.
   (i) High self-efficacy group performed better in history than that of average self-efficacy group.
   (ii) High self-efficacy group performed better in history than that of low self-efficacy group.
3. There exists significant interaction between method of instruction and self-efficacy of learners on the gain achievement scores in history.
   (i) High self-efficacy group of experimental group performed better in history than that of average self-efficacy group of experimental group.
   (ii) High self-efficacy group of experimental group performed better in history than that of low self-efficacy group of experimental group.
   (iii) High self-efficacy group of experimental group performed better in history than that of high self-efficacy group of control group.
   (iv) High self-efficacy group of experimental group performed better in history than that of average self-efficacy group of control group.
   (v) High self-efficacy group of experimental group performed better in history than that of low self-efficacy group of control group.
   (vi) Average self-efficacy group of experimental group performed better in history than that of high self-efficacy group of control group.
   (vii) Average self-efficacy group of experimental group performed better in history than that of average self-efficacy group of control group.
   (viii) Average self-efficacy group of experimental group performed better in history than that of low self-efficacy group of control group.
   (ix) Low self-efficacy group of experimental group performed better in history than that of high self-efficacy group of control group.
   (x) Low self-efficacy group of experimental group performed better in history than that of average self-efficacy group of control group.
   (xi) Low self-efficacy group of experimental group performed better in history than that of low self-efficacy group of control group.

(xii) High self-efficacy group of control group performed better in history than that of low self-efficacy group of control group.

11. Conclusion

The present study reveals that the mean gain achievement scores in history of 9th class learners taught through visuals learning approach was significantly higher than those which were taught through conventional teaching approach. Further, the two instructional treatments yield significant difference in achievement in history mean gain scores of learners with high, average and low self efficacy. However, the difference in gain mean achievement scores for interaction across different groups found significant. The study recommends the use of teaching through visuals approach for teaching the subject of history.

References

1. Aiken, L. R. (1985). Three coefficients for analyzing the reliability and validity of ratings. *Educational and Psychological Measurement*, *45*(1), 131-142.
2. Al-Mamun, M. (2014). *Effectiveness of audio-visual aids in language teaching in tertiary level*. Unpublished Doctoral Dissertation, BRAC University Institutional Repository, Bangladesh. Retrieved March 10, 2019 from http://dspace.bracu.ac.bd/xmlui/.
3. Bamford, A. (2018).*The visual literacy white paper*. Australia: Adobe System Pyt. Ltd. Retrieved March 8, 2019 from https://www.aperture.org/wpcontent/uploads/2013/05/visual-literacy-wp.pdf.
4. Bandura A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.
5. Bandura A. (1997). *Self-Efficacy: The exercise of control*. New York, NY: Freeman.
6. Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191–215.
7. Bobek, E., & Tversky, B. (2016). Creating visual explanations improves learning. *Cognitive Research: Principles and Implications*, *1*(1), 27.
8. Cronbach, L. J. (1984). *Essentials of psychological testing* (4th ed.).New York: Harper and Row.
9. Crow, L. D., & Crow, A. (1956). *Understanding our behavior.* New York: Alfred A. Knopf Publishers.
10. deFátima Goulão, M. (2014). The relationship between self-efficacy and academic achievement in adults' learners. *Athens Journal of Education*, *1*(3), 237-246.
11. DeSousa, L., Richter, B., & Nel, C. (2017). The effect of multimedia use on the teaching and learning of social sciences at tertiary level: A case study. *Yesterday and Today*, 17, 1-22.
12. Evagorou, M., Erduran, S., & Mäntylä, T. (2015). The role of visual representations in scientific practices: from conceptual understanding and knowledge generation to 'seeing'how science works. *International Journal of STEM Education*, *2*(1), 11.
13. Hegarty, M. Carpenter, P.A., & Just, M.A. (1991). Diagrams in the comprehension of scientific texts. In R. Barr, M. L. Kamil, P. B. Mosenthal, & P. D. Pearson (Eds.), *Handbook of reading research,* Vol. 2, pp. 641-668. Hillsdale, NJ, US: Lawrence Erlbaum Associates, Inc. Retrieved March 08, 2019 from https://psycnet.apa.org/record/1996-97884-013.
14. Hegarty, M., & Just, M.A. (1993). Constructing mental models of machines from text and diagrams. *Journal of Memory and Language,32*(6), 717–742.
15. Hegarty, M., Kriz, S., & Cate, C. (2003). The roles of mental animations and external animations in understanding mechanical systems. *Cognition & Instruction, 21*(4), 325–360.
16. Kessell. A.M., & Tversky, B. (2011). Visualizing space, time, and agents: Production, performance, and preference. *Cognitive Processing, 12(1)*, 43–52.
17. Larkin, J. H., & Simon, H. A. (1987). Why a diagram is (sometimes) worth ten thousand words. *Cognitive Science*, *11*(1), 65-100.
18. Levine, A. (1982). Qualitative research in academic decision making. *New Directions for Institutional Research*, *1982*(34), 73-79.
19. Mathur, G.P., & Bhatnagar, R.K. (2012). *Self-efficacy scale*. Agra: National Psychological Corporation
20. Meera, K. P., & Jumana, M. K. (2015). Self-efficacy and academic performance in english. *Research in Pedagogy*, *5*(2), 25-30.
21. Multon, K. D., Brown, S. D., & Lent, R. W. (1991). Relation of self-efficacy beliefs to academic outcomes: A meta-analytic investigation. *Journal of Counseling Psychology, 38*(1), 30-38.
22. Punzalan, J. F. (2018). The impact of visual arts in students' academic performance. *International Journal of Education and Research, 6*(7), 121-130.
23. Rasul, S., Bukhsh, Q., & Batool, S. (2011). A study to analyze the effectiveness of audio visual aids in teaching learning process at university level. *Procedia-Social and Behavioral Sciences*, *28*, 78-81.
24. Rymer, K. R. (2017). *Assessing self-efficacy to improve impoverished students'education. Unpublished* Doctoral Dissertation, Carson-Newman University, Tennessee, United States. Retrieved January 11, 2019 from http://www. cn.edu/libraries/ tiny_mce/tiny_mce/ plugins/filemanager/files/ Dissertations/Dissertations2017/ Kayla_Rymer.pdf.
25. Schunk D. H., Pintrich P. R., & Meece J. L. (2008). *Motivation in education: Theory, research and applications* (3rd edn). Upper Saddle River, NJ: Merrill-Prentice Hall.
26. Shabiralyani,G., Hasan, K.S., Hamad, N., & Iqbal, N. (2015). Impact of visual aids in enhancing the learning process case research: District Dera Ghazi Khan. *Journal of Education and Practice, 6*(19), 10-16.
27. Tiyuri, A., Saberi, B., Miri, M., Shahrestanaki, E., Bayat, B. B., & Salehiniya, H. (2018). Research self-efficacy and its relationship with academic performance in postgraduate students of Tehran University of Medical Sciences in 2016. *Journal of Education and Health Promotion*, *7*. Retrieved April 16, 2019 from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5791442/
28. Torres, R. M. (1993). *The cognitive ability and learning styles of students enrolled in the college of agriculture at the Ohio state university.* Unpublished Doctoral Dissertation, Columbus:The Ohio State University. Retrieved October15, 2018 from https: //etd. ohiolink. edu/rws_etd/ document/get/osu 1300461365/inline.

29. Tversky, B., & Suwa, M. (2009) Thinking with sketches. In A.B. Markman & K.L. Wool, (eds), *Tools for innovation*, Oxford: Oxford University Press.
30. Usher E. L., Pajares F. (2008). Sources of self-efficacy in school: Critical review of the literature and future directions. *Review of Educational Research 78(4)*, 751–796.
31. van Rooij, E. C., Jansen, E. P., & van de Grift, W. J. (2017). Factors that contribute to secondary school students' self-efficacy in being a successful university student. *Research in Post-Compulsory Education*, *22*(4), 535-555.

