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Effects of ICT assisted Real and Virtual learning on the performance of secondary school students

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Abstract

The study aimed to assess the effect of ICT assisted real and virtual learning performance over the traditional approach of secondary school students. Non-Equivalent Pretest-Posttest Quasi Experimental Design used to assess and relate the effects of independent variables virtual learning on dependent variables (i.e. learning performance). Extraneous variables minimized through ANCOVA, and in fact, the findings generalized on the whole population. Class IX of school 1(n=55) assigned to traditional approach, Class IX of school 2 (n=60) assigned for real learning approach(YouTube and Wikipedia), and Class IX of school 3 (n=55) assigned for virtual learning approach (i.e. Skype, Video Conferencing,& Recorded Audio-Video lecture) among the secondary school students (e.g. Class- IX) of two selected schools. It resulted that there was statistically significant difference among the pretest and posttest mean of the learning performance of ICT assisted Real learning (YouTube & Wikipedia) Group, ICT assisted Virtual learning (Skype & video lecture) Group over Traditional learning Group of students.

Key words: ICT, performance, real learning, secondary school students, virtual learning

Introduction

In this 21st century we are living in knowledge based global world where there is a rapid advancement of science and technology (Almekhlafi, 2006). Recently, youtube, Wikipedia, animation, skype and imo software or technology used for distance learning within at minimum time and at maximum lowest cost (Zhan & Mei 2013). These virtual learning processes are operating through ICT for making learning meaningful and high retention (Al-Salameh,2011). Currently, it is in question, whether virtual learning is applicable in secondary education of India or it is limited within the developed countries. The online ICT is an effective tool, which provides knowledge and information to the learners through www for self-learning

(Cevik,Haslaman, Celik 2015). Online ICT provides knowledge, skill and competency through Wikipedia, Wikimedia, online pdf file, online html file, video-conferencing, audio- conferencing, and mobile-conferencing, Skype, and through direct online smart kits (Chen,Chang, Chien,Tijus, and Chang, 2015). In recent days; researchers, educators, scholars, students are mostly using internet as the ICT assisted learning.

Virtual learning is a system of delivering learning materials to students via the web or recorded audio and video lectures (Tulbure,2012). This system includes assessment, students direct participation, student tracking, collaboration and communication tools. Virtual learning environment allows participants to learn or acquire knowledge in a collaborative, co-operative learning activities and interactions. Virtual learning environment includes a course syllabus, pre- requisites registration, skilful mentor or instructor, and distant learning applications (Fu, 2013). This normally includes materials such as copies of lectures in the form of text, audio/video presentations and the supporting visual presentations (Gurol,Kayisli,Basal,2010).. Virtual classroom includes different types of communication system, multi-dimensional communication process, threaded discussions, chat – rooms, twitter, Skype, wikis, blogs, 3D visual learning spaces in reading (Hayes, & Allinson, 1994). Such type of reading needs collaboration and co-operation of students to share the information among each other. Literature found that recently, virtual learning models, teacher- educators, and researchers are using in their classroom (Jena, 2015a). Hayes, Allinson, Hudson, & Keasey, 2003) found that online learning improve the achievement of the students and it effects directly the perception. However, (Rahmani, 2012) argued that online co- operative learning is a constructive controversy, it trusts with more effectiveness then constructive controversy for student achievement. Face-to-face and on-line learning has significant effect on student's achievement (Jena, 2015**b**). Similarly, Johannesen,2013). found that online collaborative learning activities help to solve problem and develop solving skills. In fact, achievement and emotion affect students' decision for online learning (Koc, 2005) and participation, interaction and academic achievement are highly related with virtual or online learning environment (Dascalu, & Trăuşan-Matu,2015). The current study sought to extend research on the

contributions of different studies on ICT and virtual learning; those directly influence the achievement of the learners (Nam, 2014). Here, learning performance is a dependent variable needs learners' interest, attitude, cognitive styles, learning styles and pace of learning (Neeru, 2015).. Wiki and online animation presentation enhances real learning and learners achieve high achievement and long retention (Palak, & Walls, 2009).). Similarly, the real learning environment is only possible through online collaborative YouTube learning effects the academic achievement of students. In an experimental study, Rao, 2014) found that smart classroom is better for low – achievers and high- achievers than traditional classes. Sadler-Smith, & Badger,1998 found power-point presentation has significant effect on the achievement of the learner. Similarly, using interactive white-board in teaching and learning through smart classroom establish teacher – students attention towards getting meaningful learning (Sang, Valcke, Braak, and Tondeur, 2010). In the above literature, it is very difficult to determine that whether ICT assisted real learning environment has certain effect on achievement of the learners or not.

Box 1 Design of the study

Hypothesis

1: There is no significant effect of ICT assisted real and virtual learning performance over the traditional approach of secondary school students.

Methodology

Non-Equivalent Pretest-Posttest Quasi Experimental Design used to assess and relate the effects of independent variables virtual learning on dependent variables (i.e. learning performance). Extraneous variables minimized through ANCOVA, and in fact, the findings generalized on the whole population. 170 class IX students were the participants of three secondary schools randomly selected out of 1000 secondary schools of Silchar. Class IX of school 1(n=55) assigned to traditional approach, Class IX of school 2 (n=60) assigned for real learning approach(*youtube and wiki*), and Class IX of school 3 (n=55) assigned for virtual learning approach (i.e. *Skype, Video Conferencing,& Recorded Audio-Video lecture*) among the secondary school students (e.g. Class- IX) of two selected schools. Before instruction, the researcher had administered pre test on Geography, cognitive style and learning style questionnaire. The overall design of the study is shown in the Box 1.

Sl. no	Group	Pre Intervention Test	Treatment	Post Intervention test
1	Traditional(n=55)	Achievement Test	Traditional	Achievement Test
2	Real learning (n=60)	Achievement Test	Wikipedia & YouTube	Achievement Test
3	Virtual learning(n=55)	Achievement Test	Skype & Video conferencing	Achievement Test

Participants

170 Participants included all the secondary schools of Silchar Town and all the secondary students studying in Class IX. The present study is a Quasi-Experimental Design assessing the effect of independent variable (*i.e. real learning, virtual learning*) on dependent variable (*i.e. learning performance*). For that purpose, the researcher had randomly selected three English medium secondary schools of Silchar Town. Similarly, out of more than twenty-five secondary schools having five thousand students, the researcher had randomly selected 170 students to conduct the experiment.

Instrumentation

Achievement test on Geography

An achievement test on Geography (Deka & Jena,2015) for Class IX was developed by following all the standardized criteria. The contents were selected after discussing with the school administration and accordingly the blueprint was developed. It is proposed that a 25 mark multiple-choice items having a correct response, two wrong responses and a strong distracter will frame for each item followed by measuring the correction of guessing, item difficulty, and item discrimination power. This achievement test on Geography is a standardized test of academic potential. The normative group for the test randomized among the cross-cultural group of Indian who accurately reflect the diversity of that group of respondents of the test. In psychology, the normative group for a test used to assess the achievement among the parents of 14- to -15year-olds in India was the sample of parents of 14- to 15-year-olds from various demographic groups in India. Content Validity Ratio (C.V.R.) and Cronbach, α was .61 and .86. respectively.

Procedures

The recent study is Information and Communication Technology (ICT) assisted activity based experimental study

over traditional approach. Before experiment; the traditional and the ICT assisted virtual learning group received the pre test, cognitive style questionnaire, learning style inventory to respond. After collection of the data through the questionnaire, the researcher had scored and divided virtual learning classes into four groups. Before instruction, one-hour training session was provided to the students to familiarize with the ICT, software and hardware. After instruction, the same achievement on geography was administered as the post – test of the study. After collecting the data, the scoring and analysis was prepared.

Activity I- Traditional Treatment

Class IX of School- I was counted as the traditional group for the traditional treatment. The researcher had prepared the traditional lesson plans for classroom transaction. In this process, the researcher had followed the traditional methodology to teach Geography. Before instruction, a pre-test on geography, cognitive style questionnaire and learning style inventory was administered and after instruction, a post-test or achievement test was administered.

Activity II – Real Learning Treatment

The CBSE affiliated Class IX students of School II assigned for real learning treatment and earlier to that traditional lesson plans developed on all the concepts of India – Size and Location, Physical Features of India, Drainage and climate for classroom transaction. The details of the syllabus, contents and concepts showed in table 3.15. Before instruction, a pre-test on Geography, cognitive style questionnaire and learning style inventory was administered among 60 participants of ICT assisted real learning experimental group I [i.e. 20 deep learners (n=20), strategic learners (n=25) and surface learners (n=15)] and no students were found apathetic learner. Deep learners' were divided into four groups with four laptops to each group, and in the same way strategic learners were divided into five groups and a laptop was provided to each group. A total of 15 students of surface learners were divided into three groups facilitated with three laptops to each group and followed by that pre technical instruction on how to connect internet, on how to browse Online Wikipedia and on how to run the YouTube to learn the course of contents. Accordingly, the chapter I, II,III and IV students learnt through Online Wikipedia and YouTube mode. During the Wikipedia learning,

more than fifty hyperlinks learners used to acquire the knowledge from the online Wikipedia sources.

Activity III- videoconferencing

Class IX students of school- III was counted as the ICT assisted virtual learning group. Before instruction, a pre-test on geography, cognitive style questionnaire and learning style inventory was administered and after instruction, a post-test or achievement test was administered. ICT assisted virtual learning instruction was provided through Skype, Video Conferencing, and Recorded Audio-Video lecture. During instruction, the researcher divided the class into four groups (i.e. *deep learner, surface learner, strategic learner, apathetic learner*) without their concern. The researcher created a virtual learning environment through Skype, Video Conferencing, and Recorded Audio-Video lecture and the students were provided freedom to ask questions to the experts who were present online.

Analysis and Results

Hypothesis 1: There is no significant effect of ICT assisted real and virtual learning performance over the traditional approach of secondary school students.

Table 1 pretest and posttest mean and SD of learning performance of participants of ICT assisted Real learning (YouTube & Wikipedia) Group, ICT assisted Virtual learning (Skype & video lecture) Group and Traditional learning Group

Groups/Types of learners/Methods of instruction	N	Pretest		Posttest	
		Mean	SD	Mean	SD
ICT assisted Real learning(YouTube & Wikipedia) Group					
Deep learners	20	31.35	2.74	87.65	9.09
Strategic learners	15	29.68	5.25	80.36	12.60
Surface learners	15	30.80	5.14	77.93	10.78
ICT assisted Virtual learning(Skype & video lecture) Group					
Deep learners	20	34.70	3.01	83.25	9.15
Strategic learners	20	31.50	4.75	79.70	11.78
Surface learners	15	29.87	2.67	76.13	10.53
Traditional learning Group					
Deep learners	20	38.75	8.01	52.15	7.76
Strategic learners	20	31.90	3.52	56.30	5.85
Surface learners	15	28.87	5.50	43.47	7.92
Total	170	31.05	5.58	71.49	17.47

Table 1 shows the pretest and posttest mean and SD of learning performance of ICT assisted Real learning (YouTube & Wikipedia) Group, ICT assisted Virtual

learning (Skype & video lecture) Group and Traditional learning Group. Deep learners' (N=20) posttest learning performance in ICT assisted Real learning through YouTube & Wikipedia resulted (m = 87.65 ± 9.09) better over the pretest (m=31.35 ± 2.74). Similar to that, the posttest mean and SD of strategic learners' (N= 15) (m= 80.36 ±12.60) and surface learner (m= 77.93± 10.78) showed higher than their pretest (m=29.68 ±5.25) and (m= 30.80± 5.14) respectively. This showed that the YouTube and Wikipedia intervention had a great effect upon the learners' performance. ICT assisted virtual learning performance, after the Skype & video lecture intervention, resulted that deep learners' (N= 20), strategic learners' (N= 20) and surface learners' (N= 15) post test mean and SD score (m= 83.25± 9.15), (m= 79.70± 11.78) and (m= 76.13 ± 10.53) resulted better over the pre test (m= 34. 70± 3.01), (m= 31.50 ± 4.75) and (m = 29.87 ± 2.67) respectively. It showed that the posttest mean & SD of the students were much better than the pre test mean & SD due to the Skype and video lecture intervention. Not only that, it was observed that, in traditional learning group, the deep learners' (N=20) pretest (m= 38.75 ± 8.01) and posttest (m=52.12 ± 7.76); strategic learners' (N= 20) pretest (m= 31.90± 3.52) and posttest (m= 56.30 ± 5.85); and the surface learners' (N= 15) pretest (m= 28.87± 5.50) and posttest (m= 43.47± 7.92) did not show much improve, as the participants were exposed to the lecture method. The overall posttest mean & SD of the participants (N= 170) was (m= 71.49± 17.47) found better over the pretest (m= 31.05 ± 5.58).

Table 2 ANCOVA of pretest and posttest mean and SD of learning performance of ICT assisted real learning Group, ICT assisted Virtual learning Group and Traditional learning Group

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	36139.140[a]	9	4015.460	41.597	.000
Intercept	19357.048	1	19357.048	200.522	.000
Pretest	14.073	1	14.073	.146	.703
Learners	35430.031	8	4428.754	45.878	.000
Error	15445.337	160	96.533		
Total	920381.000	170			
Corrected Total	51584.476	169			

a. R Squared = .701 (Adjusted R Squared = .684)

SPSS used in univariate analysis to find out the ANCOVA among the pretest and post-test scores of the participants of ICT assisted real learning group, ICT assisted virtual learning group & traditional learning group. Here, post-test of three methods were dependent variable and pre-test was the co-variate. It was resulted that there was a significant difference among the three methods [i.e. f=df2, 4428.754 p (0.000) < α (0.05)], while there was no significance difference among the pre-test score of three groups [f=df 1 96.533 p (.000) > ∝ (0.05)] where the estimated R^2 = .701 and adjusted p^2 =.684 (*see* table 2). Hence, the null hypothesis was rejected and there was statistically significant difference among the pretest and posttest mean of the learning performance of ICT assisted Real learning (YouTube & Wikipedia) Group, ICT assisted Virtual learning (Skype & video lecture) Group and Traditional learning Group of students.

Table 3 Estimated marginal posttest mean of learning performance of ICT assisted Real learning Group, ICT assisted Virtual learning Group over Traditional learning Group

Learners		Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
ICT assisted Real learning group					
	Deep learners	87.607[a]	2.200	83.263	91.952
	Strategic learners	80.216[a]	2.001	76.264	84.168
	Surface learners	77.857[a]	2.545	72.832	82.883
ICT assisted Virtual learning group					
	Deep learners	83.411[a]	2.237	78.993	87.828
	Strategic learners	79.666[a]	2.199	75.324	84.009
	Surface learners	76.001[a]	2.561	70.944	81.057
Traditional learning group					
	Deep learners	52.557[a]	2.441	47.735	57.378
	Strategic learners	56.291[a]	2.197	51.952	60.630
	Surface learners	43.273[a]	2.587	38.164	48.382

a. Covariates appearing in the model are evaluated at the following values: pretest = 32.05.

Table 4 The F test among ICT assisted real and virtual learning and traditional learning approach

	Sum of Squares	df	Mean Square	F	Sig.
Contrast	35430.031	8	4428.754	45.878	.000
Error	15445.337	160	96.533		

Table 3 reveals the estimated marginal posttest mean of learning performance ICT assisted real learning Group, ICT assisted virtual learning Group over Traditional learning Group where covariates appearing in the model are evaluated at the following values: pretest = 32.05. The F tests among ICT assisted real, virtual, and traditional learning approach was made, and this test was based on the linearly independent pair wise comparisons among the estimated marginal means(see table 4)

Table 5 Bonferoni multiple comparison among the post – test of learning performance ICT assisted real learning Group, ICT assisted virtual-learning Group over Traditional learning Group

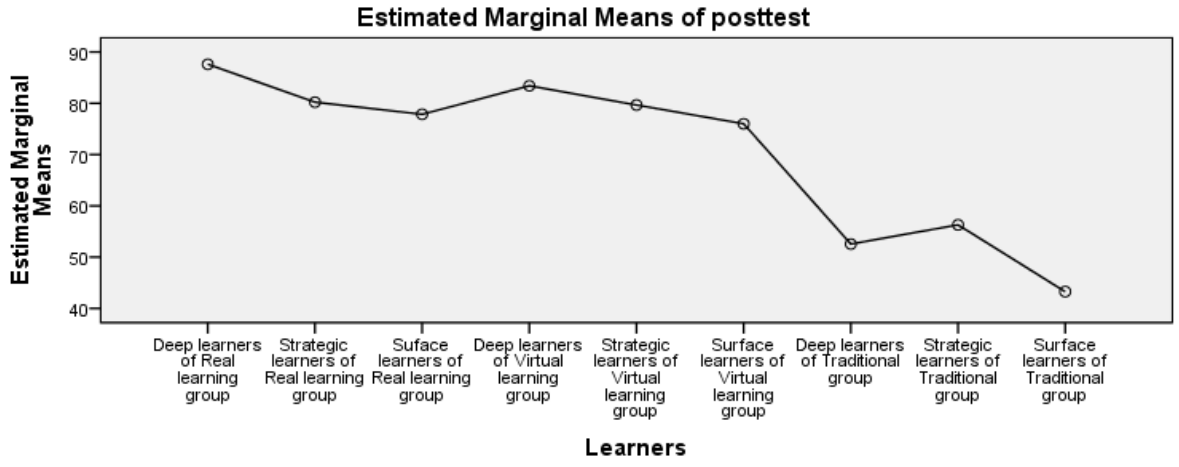
(I) Learners	(J) Learners	Mean Difference (I-J)	Std. Error	Sig.[b]
Deep learners of Real learning group	Strategic learners of Real learning group	7.391	2.959	.487
	Surface learners of Real learning group	9.750	3.357	.151
	Deep learners of Virtual learning group	4.197	3.152	1.000
	Strategic learners of Virtual learning group	7.941	3.107	.415
	Surface learners of Virtual learning group	11.607*	3.364	.026
	Deep learners of Traditional group	35.051*	3.322	.000
	Strategic learners of Traditional group	31.317*	3.108	.000
	Surface learners of Traditional group	44.334*	3.379	.000

Table 4 interprets Bonferoni multiple comparison among the posttest of learning performance ICT assisted real learning Group, ICT assisted Virtual learning Group over Traditional learning Group. The mean difference between deep learners and strategic learners of real learning group (7.391 $p< 0.05$), and the mean difference between deep learners and surface learners of real learning group (9.750 $p< 0.05$) was significant. Contrast to that, the mean difference between deep learners of real learning, and virtual learning group (4.197 $p> 0.05$) found no significant whereas the mean difference between deep learners of real learning and strategic learners of virtual learning group (7.941 $p< 0.05$) resulted significant. The

mean difference between deep learners of real learning and surface learners of virtual learning group (11.607 p< 0.05) showed significant. Similarly, the mean difference between deep learners of real learning and traditional learning group (35.051 p< 0.05), the mean difference between deep learners of real learning and strategic traditional learning group 31.317 p < 0.05, and the mean difference between deep learners of real learning and surface traditional learning group 44. 334 p < 0.05 observed significant (*see* graph 1).

Graph 4.1 interprets the posttest estimated marginal means among ICT assisted real learning, ICT assisted virtual learning and traditional learning approach. The X – axis is showing the various groups to which instructions provided and the Y- axis interprets the estimated marginal means of the nine groups of students. It was seen that the real learning groups (Deep, Strategic, and Surface) score was maximum comparatively virtual learning groups (Deep, Strategic and Surface) too scored more than the traditional (Deep, Strategic and Surface) groups.

Graph-1 Post- test estimated marginal means among ICT assisted real and virtual learning and traditional learning approach



Covariates appearing in the model are evaluated at the following values: pretest = 32.05

Findings & Discussion

YouTube learning performance of Secondary School Students showed significant relationship with different

cognitive styles like; perceiving, feeling, introversion and intuition has the hierarchical significant relationship with YouTube learning performance (Yilmaz-Soylu, & Akkoyunlu, 2002).. However, extroversion, sensing, thinking, judging, has no significant relationship with YouTube learning performance. The finding of the study is highly supported by Streufert, & Nogami, 1989). did not support and found that online instruction is not related to development of the learners. Like YouTube learning performance, Skype learning performance is also related with cognitive styles. It is found that Cognitive Styles have a hierarchical significant relationship with students Skype learning performance but judging, thinking, sensing, extroversion has surprisingly no hierarchical relationship with Skype learning performance. This result was supported by (Senapaty, 2004). and it was rejected by (Sternberg & Zhang, 2001). From the present study it has been found that YouTube learning in Indian context still needs lots of improvement and development as India is still lacking in the field of technology, whereas, in the developed nations it has been seen that the use of technology in classroom is very much widely followed, as for instance it is seen that in United Kingdom it is regarded as rising of standards in their teaching and learning process (Susan Nolen-Hoeksema, Martin, Joan, Girgus (1986). The use of digital technology in classroom helps in improving the delivery of education in a very efficient way, it also helps to improve the standard of education (Witkin, Moore, Goodenough, & Cox, 1977). The variables in the present study like thinking; judging, sensing, and extraversion are found to be not related with the YouTube learning performance and Skype learning performance, therefore in this regard the researcher guesses that such variables as thinking; judging, sensing, and extraversion are very ambiguous and therefore the researcher could not put a clear view as why these variables are not related with the YouTube learning and Skype learning performance (Tabatabaei & Mashayekhi, 2013). These needs a very high cognitive process and may create problem to understand the YouTube or Skype learning performances. The cognitive styles of Secondary School Students differ from the elementary school students as these may occur due to higher mental growth, age differences etc.

Conclusion

The present scenario of YouTube learning and Skype in the classroom in Indian

context has been found that it has to be improved more as compared to the other advanced countries of the world (Talbot, 1989). It is found that YouTube learning is given importance only in some schools of particular areas or states whereas other areas are not benefited or provided such technologies with. It has been seen in the classroom that students cannot benefit much in some difficult or recent topics as there is lack of knowledge of the teachers teaching them or sometimes the teacher is not properly trained so in such cases the students will be more benefitted if lectures from abroad are arranged or given to them directly from abroad or the specialist of those particular areas as they can directly make conversation with the particular person at that particular time or even later on to clarify their doubts they can even record their lecture for future use (Tempelar, Rienties and Giesbers, 2015). It is the duty of the stakeholders to take necessary precaution in this regard, especially in those remote, and backward areas where technology is far to be reached (Wei, & Chou, 2015). As because it has also been seen that it is also not much expensive one as many students can learn at a same time together from the same place, and the equipments required are also not so costly.

Educational implications

It has been seen that for making YouTube learning successful in the classroom the teachers should be well trained and should have the necessary knowledge to run the equipments and about the benefits of using such techniques in the classroom. It will also help in the professional development of the teacher and most importantly on the issues of technology in relation to the context of innovative pedagogy. They should accept the fact that students learn more easily when they are seeing it practically rather than just sitting and listening to the teacher ideally. It is also the duty of the teacher to make the students skilful in operating the devices properly so that they themselves can see and learn the study materials whenever the need is felt by them. In the way both the teacher and student will be benefited as this will help them to grow their content knowledge, and have a better and clearer view about all the topics to be learnt or discussed. The study is delimited to only secondary school students further research can be undertaken among elementary level, degree and university level students. It can also be studied upon the physically disabled children. Again here the study is undertaken using YouTube and Skype only; other Medias such as facebook, blog,

emo, etc should be chosen for further investigation.

References

[1] Almekhlafi, A.G. (2006). The Effect of Computer Assisted Language Learning (CALL) on United Arab Emirates English as a Foreign Language (EFL) School Students' Achievement and Attitude. Journal of Interactive Learning Research, Association for the Advancement of Computing in Education (AACE), *17*(2), 121-142.

[2] Al-Salameh, E.M.(2011). A Study of Al-Balqa' Applied University Students Cognitive Style, International Education Studies, 4(3) 189-193.

[3] Altun, A., & Cakan, M. (2006). Undergraduate Students' Academic Achievement, Field Dependent/Independent Cognitive Styles and Attitude toward Computers. Educational Technology & Society, 9 (1), 289-297.

[4] Cevik, D.Y; Haslaman ,T; Celik S; (2015). The effect of peer assessment on problem solving skills of prospective teachers supported by online learning activities Studies in Educational Evaluation, 44, 23-35.

[5] Chen, C. L. D., Chang, Y. H., Chien, Y. T., Tijus, C., and Chang, C. Y (2015). Incorporating a smart classroom 2.0 Speech-Driven PowerPoint System (SDPPT) into university teaching, Smart Learning Environments 2(7) 1- 11.

[6] Dascalu,M., Trăuşan-Matu,S. (2015). Visualization of polyphonic voices inter-animation in CSCL chats Ştefan Trăuşan-Matu1,2,3, Mihai DascaluRevista Romana de Interactiune Om-Calculator 8 (4) 2015, 303-320.

[7] Deka,M. & Jena,A.K.(2015). Achievement test on geography, Assam University, Silchar.

[8] Fu,J.S.(2013). ICT in Education: A Critical Literature Review and Its Implications. International Journal of Education and Development using Information and Communication Technology (IJEDICT), 9(1)112-125.

[9] Gurol,T.S.A., Kayisli,K., Basal,A. (2010). Hidden programme and application development in web-based education, Procedia - Social and Behavioral Sciences 2 (2),5114–5119.

[10] Hayes, J., & Allinson, C. W. (1994). Cognitive style and its relevance for management practice. British Journal of Management, 5, 53–71.

[11] Hayes, J., Allinson, C. W., Hudson, R. S., & Keasey, K. (2003). Further reflections on the nature of intuition-analysis and the construct validity of the Cognitive Style Index: Comment. Journal of Occupational and Organizational Psychology, 76, 269 –278.

[12] Jena, A.K (2015a). Animation model to conceptualize ATP generation: a mitochondrial oxidative phosphorylation, European Journal of Science and Mathematics Education. 3(3),61-76.

[13] Jena,A.K. (2015b). Effects of web reading, online animation models, online flash models, and online youtube learning in digestive system,The Online Journal of Distance Education and e-Learning, 3, 4 28-43.

[14] Johannesen, M (2013). The role of virtual learning environments in a primary school context: An analysis of inscription of assessment practices, British Journal of Educational Technology 44(2), 302–313.

[15] Koc, M.(2005). Implications of learning theories for effective technology integration and preservice teacher training: A critical literature review, Journal of Turkish Science Education, 2,2-18.

[16] Messick, S. (1976). Personality consistencies in cognition and creativity. In S. Messick (Ed.), Individuality in learning (pp. 4 –23). San Francisco: Jossey-Bass.

[17] Nam,C.W.(2014).The.effects of trust and constructive controversy on student achievement and attitude in online cooperative learning environments. *Computers in Human Behavior, 37, 237-248.*

[18] Neeru,S. (2015). Scientific Creativity in relation to Cognitive Style and Achievement in Science of Secondary School Students, An International Journal of Education and Applied Social Sciences,6(1) 25-29.

[19] Palak, D., & Walls, T. R.(2009). Teachers‟ beliefs and technology practices: A Mixed-methods approach. Journal of Research on Technology in Education, 41(4), 417-441.

[20] Rahmani,J. (2012). Learning Styles and Academic Achievement: a Case Study of Iranian High School Girl's Students Procedia - Social and Behavioral Sciences,51, 1030 – 1034.

[21] Rao,B. V. (2014). A Study of Academic Achievement in Mathematics in Relation to Cognitive Styles and Attitude Towards Mathematics, Global Journal for Research Analysis,3(1) 7-8.

[22] Sadler-Smith, E., & Badger, B. (1998). Cognitive style, learning and innovation. Technology Analysis & Strategic Management, 10, 247–265.

[23] Sang, G., Valcke, M., Braak, J. and Tondeur, J., (2010). Student teachers' thinking processes and ICT integration: Predictors of prospective teaching behaviors with educational technology, Computer and Education, 54, 103-112.

[24] Senapaty, H.K.(2004). Integrating Digital Technology into Constructivist Learning Environment. Paper presented in the International Conference held at Saurastra University, Rajkot, Gujarat, India, 5(1) 465- 474.

[25] Sternberg, R. J., & Zhang, L. F. (2001). Thinking styles across cultures: Their relationships with student learning. In R. J. Sternberg & L. F. Zhang (Eds.), Perspectives on thinking, learning and cognitive styles (pp. 227–247). Mahwah, NJ: Erlbaum.

[26] Streufert, S., & Nogami, G. Y. (1989). Cognitive style and complexity: Implications for I/O psychology. In C. L. Cooper & I. Robertson (Eds.), International review of industrial and organizational psychology (pp. 93–143). Oxford, United Kingdom: Wiley.

[27] Susan Nolen-Hoeksema, Martin E. P, Joan S. Girgus (1986). Learned helplessness in children: A longitudinal study of depression, achievement, and explanatory style. Journal of Personality and Social Psychology 51(2)435-442.

[28] Tabatabaei, O., & Mashayekhi, S. (2013). The Relationship between EFL Learners' Learning Styles and their L2 Achievement. Procedia-Social and Behavioral Sciences, 70, *245-253.*

[29] Talbot, R. P. (1989). Valuing differences in thinking styles to improve individual and team performance. National Productivity Review, 9, 35–50.

[30] Tempelaar, D. T.; Rienties, B. and Giesbers, B. (2015). Stability and sensitivity of Learning Analytics based prediction models. In: Proceedings of 7th International conference on Computer Supported Education (Helfert, Markus ; Restivo, Maria Teresa; Zvacek, Susan and Uho, James eds.), 23-25 May 2015, Lisbon, Portugal, CSEDU, pp. 156–166.

[31] Tulbure,C. (2012). Learning styles, teaching strategies and academic achievement in higher education: A cross-sectional investigation, Procedia - Social and Behavioral Sciences, 33, 398- 402.

[32] Wei, H.W.,& Chou, C.(2015). Can more interactivity improve learning achievement in an online course? Effects of college students' perception and actual use of a course-management system on their learning achievement. *Computers & Education, 83, 10-21*

[33] Witkin, H. A., Moore, C. A., Goodenough, D. R., & Cox, P. W. (1977). Field dependent and field independent cognitive styles and their educational implications. Review of Educational Research, 47, 1– 64.

[34] Yilmaz-Soylu, M. & Akkoyunlu, B. (2002). The effect of learning styles on achievement in different learning environments. The Turkish Online Journal of Educational Technology; 8(4) 43-50.

[35] Zhan, Z ; & Mei Hu (2013). Academic self-concept and social presence in face-to-face and online learning: Perceptions and effects on students' learning achievement and satisfaction across environments. *Computers & Education, 69, 131-138.*