Development of Multimedia Courseware for Second Language Acquisition.

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Abstract

Multimedia technologies are increasingly used in higher education for effective teaching-learning process. In this changing landscape, the development of Multimedia Courseware is an essential domain for research. The primary objective of the research is to develop a multimedia package for teaching technical writing using a constructivist theory of learning. The secondary objective is to compare the efficacy of multimedia instruction to that of traditional instruction. An experimental design was employed to test the effectiveness of the multimedia method. Thirty students from the control group and thirty students from the experimental group were chosen for this study. The control group was exposed to traditional instruction, and experimental group was subjectedto multimedia instruction. The instrument of data collection was the test performance and student feedback questionnaire. A paired sample t-test was used to assess the effectiveness of the new method. The significance level of the t-test was set at an Alpha value of < 0.05. The findings of the study indicated that the experimental group whowere taught using multimedia materials performed better than the traditional group who were taught using traditional materials. The results of this study are expected to have positive implications for efficient delivery of content in writing classrooms. Although this study reports on technical writing, such instructional practices can be extended to all domains.

Keywords: Multimedia, Constructivism, Computer Aided Instruction, Technical Writing,

1.Introduction

"Multimedia is a combination of text, video, animation, audio, graphics, visuals and interactive applications[1]. The interactive dimension of multimedia can significantly enhance the teaching learning process, especially at tertiarylevel. It is the responsibility of the instructor to make use of the appropriate tools to deliver the content effectively. To effectively integrate technology three elements are essential. They are atheory, technology, and pedagogy[2].The essence of this paper is based on the proposition, that learner engagement can be increased using multimedia tools. With appropriate support, guidance and training technology can help learners to gradually become autonomous and efficient learners[3].Students of the 21stcentury have a natural inclination for learning through technology. Recent studies have reported on the effectiveness of technology integration for improving language skills[4,5..]Institutions of higher education have emphasised technology integration in classrooms. Recent studies have also emphasised the need for intervention studies to understand the effectiveness of multimedia integration. "Teachers and designers should indulge in interventions and learning activities that are pedagogically informed and make efficient use of

technology. Practical engagement techniques are necessary in technology integration, and such strategies should become standard practice.A large-scale research on multimedia enhanced learning environment suggests that there is better learning outcome among students who are exposed to such interactive and collaborative environments [6,7].

2. Theoretical background

To design a multimedia course, a strong theoretical foundation is essential. This paper analyses the importance of constructivism for the development of any multimedia courseware. Using constructivism as a conceptual background the researcher has developed a multimedia package for teaching technical writing. The principles applied in this study can be used in any learning settings. Constructivism is a scientific theory on how people learn. Students construct their knowledge by questioning and exploring in groups[8]. The theoretical base of this paper is based on the principles of Socio-constructivism which has been developed from the theory of Vygotsky[9]. According to the Constructivist, theory learners construct their knowledge through engagements in collaborative learning activities with other students, with the instructor, and with the learning environment. They can see a problem from different perspectives and can negotiate and generate meanings and solutions through shared understanding. Members of the learning community work in close cooperation to construct new ideas. Planning requires much thinking, generating ideas, sharing, and many revisions. Group outlining and group review helps student writers to present their ideas in clear and meaningful structures. The advantages of discussion and group collaboration in the writing process include the reduction of writing anxiety [10,11].

3.Research questions

This experimental study is guided by the following research questions.

Is there a statistically significant difference between the pretest and posttest of the control group who are exposed to conventional teaching materials?

Is there a statistically significant difference between the pretest and posttest of the experimental group who are subjected to multimedia materials?

3.1 Methods and materials

This study was carried out at B.S.Abdur Rahman University one of the premier engineering institutions in India, which lays emphasis on innovative research. It has a Track record of 32 years of Excellence in offering Engineering, Science and Management programmes. 68 students who signed the informed consent were randomly selected. The data collection instruments were the pretest, posttest and student feedback questionnaire.8 candidates who were not regular were excluded from the study. A sample size of 30 students from the control group and 30 students from the experimental group were taken for the study. The participants were told about the purpose and benefits of participating in the study. After an initial orientation, a pretest was administered to participants in both groups. After the pretest, the control group was exposed to thetraditionalmethod, and the experimental group was exposed to the multimedia-enhanced instruction. After the intervention both the groups were again exposed to a post-test. The difference in the performance level of both groups was assessed. Finally, a student feedback questionnaire was administered to understand the effectiveness of multimedia materials.
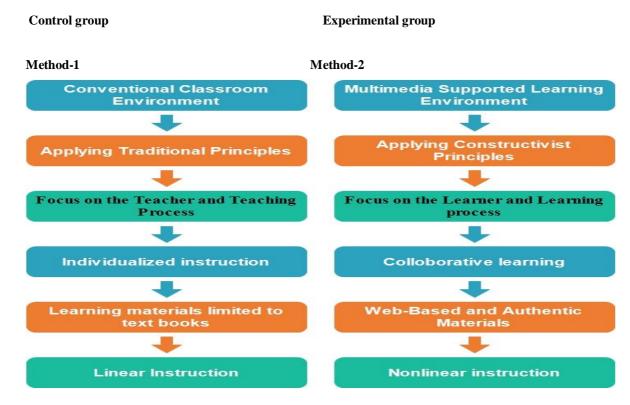
Control group   **Experimental group**

Method-1   **Method-2**

Conventional Classroom Environment	Multimedia Supported Learning Environment
Applying Traditional Principles	Applying Constructivist Principles
Focus on the Teacher and Teaching Process	Focus on the Learner and Learning process
Individualized instruction	Colloborative learning
Learning materials limited to text books	Web-Based and Authentic Materials
Linear Instruction	Nonlinear instruction

Figure-1. Flow chart of comparative analysis of teaching methods for both groups.

Figure-1 exemplifies the method of instruction employed for both the control and the experimental groups. As mentioned above the control group was exposed to the traditional teaching environment. The experimental group was exposed to multimedia supported thelearning environment. Traditional principles were appliedto the control group. The traditional principle in the research context refers to the lecture method. In this method, the teacher's role is restricted to disseminating information. The experimental group was exposed to constructivist principles. The difference between both the methods is further exemplified in the flow chart. In the traditional method there was a focus on the teaching process, and in the multimedia method, there was a focus on the learning process. In the traditional method, the target learners receive individualised instruction whereas in the multimedia group the learners receive collaborative instruction. Learning materials for the control group were limited to the textbook. On the other hand, the learning materials for the experimental group were web based and authentic materials. The instruction for the control group was linear whereas the instruction for the experimental group was nonlinear. Overall, eight instructional hours were required for each group.

3.2 Description of Multimedia Materials used in the study

Educational technology is a rapidly growing domain. Every day there is a proliferation of new tools which can be leveraged for educational purposes. In this present study multimedia, technologies are used for material design and as an instructional aid. Most of the materials used in the study are lightweight technologies. Technologies that are simple and easier to use are called as lightweight technologies[12]. In the present study, these technologiesare used for the following pedagogical reasons such as i) creation of video tutorials ii) creation of podcasts. iii) creation of mind maps and iv) creation of Word webs. In conjunction

with the objectives stated above a package named as the multimedia package for writing lab (MPWL) was developed by the researcher. The efficacy of this multimedia package was tested for teaching a discursive essay. As stated earlier the control group was exposed to traditional teaching materials and the experimental group was exposed to the multimedia package developed by the researcher. The component of instruction was a discursive essay on environmental issues. The teaching phases for both groups are explainedin

Table-1

Description of the Teaching Phases

Phases	Control group	Experimental group.
Phase-1	The instructor told the students that they are going to write an essay on environmental issues. He gave them a few guidelines on writing an essay.	The instructor created a podcast on writing a discursive essay using the audio recorder 'Audacity'.For audio editing and postproduction, the multimedia freeware 'Garageband'was used. The audio file was compressed using 'monkeys audio.'
Phase-II	He explained the three parts of the essay such as introduction, body, and conclusion.	The instructor created a video tutorial for recording the video and for editing the multimedia tool ezwid was used. The instructional video was compressed using the video compression tool 'handbrake.'
Phase-III	The students were asked to create a wordlist related to the writing task.	The students are given a collaborative project on word building using the cloud generator 'tag cloud'.
Phase-IV	The students are given time to think and write about the topic individually.	The students were asked to discuss the concepts and write a rough draft collaboratively.
Phase-V	The teacher gave them a classroom lecture on the kinds of errors in writing and gave a peer editing checklist to correct their errors.	The teacher told them to correct the errors with the help of the tool 'reverso'.
Phase-V1	The students were advised to follow theguidelines in proper order and write the essay. (The instruction was linear)	The students were toldthat they need not follow these steps in the same order to write the essay. (The instruction was non-linear)

3.3 Brief description of the tools used in the study

The following tools were used for the design of content and delivery of classroom instruction. These toolswere chosen because they are free open source tools.

1.Audacity: Audacity is a free tool that can be used to create audio files. In this study, the instructor used Audacity for creating an instructional podcast on essay writing.

2.Garage band: After creating the podcast, the instructor used 'Gargeband' for audio editing and post-production purpose. The process of editing, saving and sharing the podcast is much easier. Besides editing the instructor added external audio files andrelevant podcasts from the internet.

3.Monkeys audio – Once the audio was edited the instructor used monkey's audio for compression of files. It is a highly effective tool for reducing the size of big audio files.

4.Movavi video maker- The instructor used the movavi maker suite for creating tutorial videos. It is a user-friendly tool even for the novice users of technology. 'Edwid' is another alternate to movavimaker is yet another effective and free video creation tool.

5.Tagcloud: Tag cloud was used for vocabulary generation. Students were encouraged to create their word clouds before writing the discursive essay.

6.Reverso: To help the learners identify the grammatical and spelling errors the online editing tool reversowas used. It is an interactive online spell checker and grammar checker software. The screen shots of the tools used in the study are presented below in the form of a collage.

Figure-2. Screenshots of the tools used in the study.

4.0 Data Analysis

The data was analysed using both descriptive and inferential statistics. Initially, the mean scores of the pretest and posttest of both control and experimental group were analysed. Table-2 indicates the test performance of both groups. In the control group, the mean difference between the control group and the experimental group is negligible. The average scores have improved from 3.28 to 3.33 with a standard deviation of 0.92 and 1.07 respectively. On the other hand, the difference between pretest and post-test scores of the experimental group is significant. In the pretest, the mean was 3.57 whereas in the posttest it is 5.95. The standard deviation was also much higher in the post test of the experimental group. Another important observation is that the pretest mean scores of the control and the experimental groups are similar. The similarity in the pretest scores between both groups indicates homogeneity between groups. The comparative analysis of the mean and S.D are represented in the Figure-3.

Table-2. Comparative Analysis of Mean and S.D of test performance.

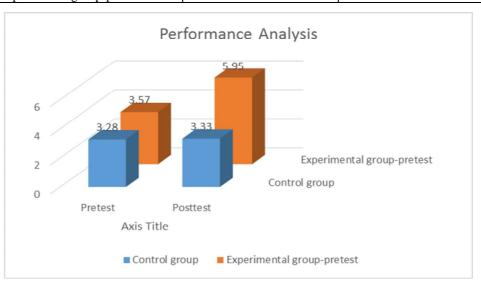| Test-Details	Mean	S.D
N=60 Control group = 30 Experimental group=30		
Control group-pretest	3.28	0.92
Control group-posttest	3.33	1.07
Experimental group-pretest	3.57	0.71
Experimental group-post-test	5.95	1.82

Figure-3. Comparative analysis of pre-test and post-test of both groups.

Based on the analysis of mean and standard deviation it is clear that the experimental group has outperformed the control group. However, themean scores alone do not provide clear evidence of test significance[12.]Hence, a paired sample t-test was conducted using SPSS version 15. Table-3 represents the paired t-test of the control group. Likewise, Table 4 indicates the paired t-test results of the experimental group.

Table-3. Paired differences of control group

Mean	S. D	S.D Mean error	95% Confidence Interval		t	df	Sig 2-tail
			Lower	Upper			
0.6452	1.50412	.27015	.61623	.48720	239	30	.831

The paired mean difference of the control group is a mere 0.64. The standard deviation is 1.50. Similarly,the lower limit mean in confidence intervalis .616 and for upper, it is .487.The two-tailed significance was .813. As mentioned earlier the significance of the test is set at an alpha value of <0.05.However,the two-tailed value for the control group was.813Hence. it is clear that the paired difference was statistically insignificant.

Table-4. Paired differences of experimental group

Mean	S. D	S.D Mean error	95% Confidence Interval		t	df	Sig 2-tail
			Lower	Upper			
2.38710	1.89169	.33976	3.08097	1.69322	7.026	30	.000

The paired mean difference of the experimental group is 2.38. The standard deviation is 1.89. Similarly, the lower limit mean in confidence interval is 3.08 and for upper, it is .487. The two-tailed significance is .000. As the importance of the test was set at an alpha value of <0.05 it is clear that the paired difference is statistically significant.

4.1 Analysis of student feedback

The questions in this segment are related to the efficacy of multimedia environment, effectiveness of the tools, writing skills, level of collaboration, the relevance of the tools used in the study, and overall improvement in writing skills. All the students who completed the experimental study responded to the questionnaire. The results of the students' feedback questionnaire are given in Table-4.The number of students who responded to the questionnaire and the percentage of responses is indicated in the Table-5.

Table-6. Student feedback questionnaire

No	Questions	Agree	Disagree	Not sure
1	Multimedia supported learning environment is effective	24 80%	4 13%	2 6.6%
2	The tools used in the study addressed my writing difficulties.	23 76%	3 10%	4 13%
3	The multimedia environment helped me to work collaboratively	28 93%	2 6%	0 0%
4	The multimedia tools used in the study were relevant.	26 86%	3 10%	1 0.3%
5	My overall writing skills have improved using the multimedia tools	22 73%	6 20%	2 6.6%

Analysis of questions 1-5

Question-1: Nearly 80% of the students has agreed to the fact that the multimedia supported learning environment is effective. Only 13% of the respondents has disagreed whereas 6.6% of the students were not sure.

Question-2: 76% of the students have stated that the tools used in the study addressed their writing difficulties.10% of the students have stated that they did not find the tool to be effective. Around 13% of the students gave a neutral opinion.

Question-3: An overwhelming 93% of the candidates have stated that the multimedia environment helped them to work collaboratively. The number of students who responded in the negative was only 3%. None of the respondents has given a neutral response.

Question-4: A majority of the students (i.e. 86% of them) have stated that the multimedia tools used in the study were relevant. Only 10% of the students have stated that the tools used in the study were irrelevant.

Question-5: Nearly 73 % of the students have stated that the multimedia tools have helped them to improve their communicative skills. On the other hand, only 20% of the students have disagreedto this question. Only 2% of the respondents have given a neutral opinion.
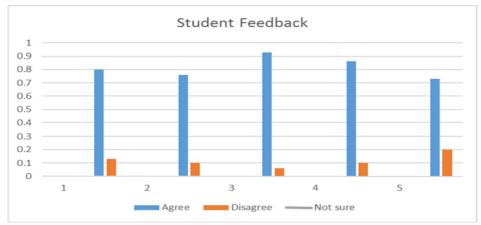

Figure-4. Student's feedback

The students' responses are illustrated in the bar chart. The blue bar represents the level of agreement and the orange bars represents the level of disagreement. Neutral responses are not evident in the bar chart as the percentage of neutral responses in all the parameters are negligible.   It is clear from the graph that multimedia package used in the study has helped the students to improve their writing skills.

5.Discussion

There is no doubt that technology enhanced classrooms are efficacious[14].Using technological tools is an effective practice in the contemporary classrooms [15.] The present study has reinforced the importance of technology integration. The mean scores of the experimental group were higher than the control group. The results showed that multimedia courseware developed for technical writing is indeed effective. The results of the experimental study have shown that multimedia materials supported by constructivist principles are a significant factor in enhancing the performance of the candidates. Even though second language writing is cognitively demanding, multimedia supported teaching has made a discernible difference in the pretests and

post test of the experimental group. The findings of this study substantiates the findings of the previous research studies[16,17]. One of the importantfindings of the study is that the constructivist theory is a promising theory in a computer-supported collaborative environment. The results of the t-test indicated that students who are exposed to multimedia courseware performed better than students who are subjected to traditional courseware.

5.1 Limitations

Although this research study has employed the parameters of a true experimental design it has some limitations. First of all,the study was conducted using only the first year engineering students. Involving the students of various semesters would have been better. Eight instructional hours is a short timespan to assess the effectiveness of the intervention. A longer timespan could have been effective. In the same way, the sample size (60 samples) is quite insufficient to assess the effectiveness of the intervention. A larger sample size would have been representative of the population. The test performance was evaluated by only one rater. If the evaluation was conducted using multiple raters and by using inter-rater reliability it would have been better. Besides multimedia intervention applying the principles of constructivism would have influenced the results. So, constructivism could have been studied as a separate variable. The researcher could not address these limitations due to logistical and practical constraints. Future researchers who wish to replicate this study could avoid these shortcomings.

5.2 Conclusion

Initially, two research questions were raised. They are i) to what extent has the new multimedia package helped the experimental group to improve their writing skills and ii)to what extent has traditional instruction helped the control group. Itwas found in this study that there was a statistically significant difference at an alpha value of less than 0.05 for the experimental group and a statistically insignificant alpha value of more than 0.05 for the control group. The student feedback has also reinforced the importance of multimedia instruction. Intervention studies of this kind for second language writing would be a promising area to explore in ELT research.

References
1. Mayer R. The Cambridge handbook of multimedia learning. Cambridge, U.K.: Cambridge University Press; Cambridge, U.K.: 2005,pp.1-11.
2. Garrett N. Computer-Assisted Language Learning Trends and Issues Revisited: Integrating Innovation. The Modern Language Journal. 2009,93(1),pp.719-740.
3. Arno-Macia E. The Role of Technology in Teaching Languages for Specific Purposes Courses. The Modern Language Journal. 2012, 96(1),pp.89-104.
4. Mirzaei A, Domakani R M, Rahimi S. Computerized lexis-based instruction in EFL classrooms: Using multi-purpose LexisBOARD to teach L2 vocabulary. ReCALL. 2015,28(01),pp.22-43.
5. Terantino J. Examining the Effects of Independent MALL on Vocabulary Recall and Listening Comprehension: An Exploratory Case Study of Preschool Children. CALICO Journal. 2014,pp.12-24.
6. Navarrete Q M, Cabrera F A. Proposing a Wiki-Based Technique for Collaborative Essay Writing. PROFILE Issues in Teachers' Professional Development. 2014,16(2), pp.185-198.
7. Dobao F A. Collaborative writing tasks in the L2 classroom: Comparing group, pair, and individual work. Journal of Second Language Writing. 2012,21(1),pp.40-58.
8. 12. Brooks J, Brooks M. In search of understanding. Alexandria, Va.: Association for Supervision and Curriculum Development; 1999.
9. Vygotsky L. Mind in society. Cambridge: Harvard University Press; 1978.
10. Li Z. Application of Online Multimedia Courseware in College English Teaching Based on Constructivism Theory. English Language Teaching. 2012,5(3),pp. 1-5.

11. M, HaiyanH .Research On Constructivism College English Multimedia Teaching Based On Bayesian Networks Modeling Algorithm. JDCTA. 2013,7(7),pp.516-523.Hinkel E. Current Perspectives on Teaching the Four Skills. TESOL Quarterly. 2006,40(1),pp.109.

12. Pascale J. Item Analysis Using the Statistical Package for the Social Sciences (SPSS. Educational and Psychological Measurement. 1980, 40(1),pp.163-164.

13. Makos A, Lee K, Zingaro D. Examining the characteristics of student postings that are liked and linked in a CSCL environment. Br J Educ Technol. 2014, 46(6),pp.1281-1294.

14. Keppell M, Suddaby G, Hard N. Assuring best practice in technology-enhanced learning environments. Research in Learning Technology. 2015,23(0),pp. 25728.

15. Molebash P. Constructivism Meets Technology Integration: The CUFA Technology Guidelines in an Elementary Social Studies Methods Course. Theory & Research in Social Education. 2002, 30(3),pp.429-455.

16. Goldman J, Krause J. Constructivism and Problem-Solving: Multimedia Projects in Schools. Curriculum and Teaching. 2003,18(2),pp.51-69.