Integration of Multimedia for Teaching Writing Skills

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Abstract

The present study examines the efficacy of multimedia integration in a writing classroom using the process approach. Contemporary practices of teaching writing include the process approach and technology integration. Therefore, multimedia integration is recommended at every stage of the process approach for better learning outcomes. The participants of the study included 60 male students comprising of control group n=30 and the experimental group n=30. Mayer's cognitive theory of multimedia learning (CTML) was used as the theoretical base and his principles were applied for the design of writing tasks. The control group was exposed to traditional input and the treatment group to multimodal input. The test performance was evaluated using IELTS writing rubrics. A paired sample t-test indicated discernible improvement in the writing skills of the experimental group. The final part of the paper deals with the pedagogical implications of multimedia integration, limitations, and scope for future research.

Keywords: writing, multimedia, cognitive theory, process approach, evaluation

Introduction

English has been taught as a second language in the Indian educational system. Despite 15 years of training and practice in writing, (English as a Second Language) ESL students at tertiary level do not possess good writing skills. According to Parr (2013), writing is a complex activity and there is no consensus on an appropriate teaching strategy in the research literature on writing. Even though assessment patterns in India are based on student performance in writing, the teaching of

writing is neglected. Jeyaraj (2005) claims that there is a dearth of technical writing courses in Indian Universities. (p.1). According to him, the teachers are not trained to teach courses in technical writing. (p.3). The author believes that the primary issues in L2 (Second Language) writing instruction are inappropriate teaching methodology and the use of conventional materials. In order to address these concerns, a blend of technology integration and the use of process approach are suggested in this paper. According to Chiu (2015), technology-enhanced learning environment needs to be supported by suitable learning materials and strategies for enhanced learning outcomes. Similar studies by Kessler, Bikowski & Boggs (2012) have reported on the importance of collaboration and integration of technology in L2 writing for improving text quality. According to Storch, "Collaborative writing has a strong theoretical base, but there is a lack of knowledge on how to structure collaborative writing tasks" (2011, p.275). In reaction to this claim, this study makes an effort to structure collaborative writing tasks using the process approach.

The Process Approach to Writing Instruction

The process approach is an approach to teaching writing that stresses on the stages of the writing process rather than on the final product (Leki, 1991). The impact of process approach is well documented in earlier studies by seminal researchers in writing pedagogy. According to White and Arndt (1991), the process approach is a cyclical process consisting of six stages such as generating ideas, drafting, structuring, reviewing and focusing. Graham and Perin (2007) in their meta-analysis concluded that the process approach to writing resulted in the improvement of the quality of writing. Similar studies by Graham, McKeown, Kiuhara & Harris (2012) provided significant insights on writing practices at primary level. Their study revealed that the process approach to writing enhanced the writing skill of the students. The effectiveness of the process approach is evident from these studies. The process approach pedagogy can be further enhanced if it is packaged according to the needs of the digital age. Hence, this study advocates multimedia integration at every stage of process approach. The multimedia integration is supported by the principles of the cognitive theory of multimedia instruction. Eventually, the effectiveness of this new approach is assessed using quantitative approaches.

Rationale for Multimedia Integration

According to Conole (2013), teachers and designers should engage in interventions and learning activities that are pedagogically informed and make effective use of technology. Keppell, Suddaby & Hard (2015) state that practical engagement techniques are important in technology integration and such strategies should become a standard practice. Nerantzi &Gossman (2015) in their exploratory research have concluded that an (Information and Communications Technology) ICT environment has the potential to increase learner engagement and performance. Other recent studies that advocate this view are Tour (2015) and Lakkala & Ilomaki (2015). These studies provide technological solutions to the writing problems.

A few studies that posit the importance of multimedia instruction are briefly summarized below. Bikowski&Vithanage (2016) claim that "technology-enhanced collaborative tools have taken L2 writing instruction into new and exciting spheres". (p.79). Bird& Edwards (2014) investigated the impact of technology usage in children. In their study, they reported that a digital framework empowered the learners to generate content. Studies by Truong & Zanzucchi (2012) suggested that multimedia plays an important role in improving students' writing skill. To enhance the writing skill of the learners they recommended the use of multimedia instruction such as video essays, audio-based feedback, and electronic portfolios. Charles and Natalia (2016) investigated the impact of multimedia instruction for the improvement of writing ability in English. Their study indicated that multimedia integration facilitated the writing skills. These studies provide sufficient evidence for integrating multimedia.

There is a growing body of research on using collaborative platforms such as Blogs, Wikis and Google docs for teaching writing. But, there is a paucity of research on integrating multimedia for teaching writing. Previous studies on multimedia deal with online environments. Using offline tasks and multimedia components such as multimedia mind maps, graphic organizers, videos, audios, films, songs and presentation tools for teaching writing are scarce. Therefore, this study attempts to blend online and offline tools for teaching writing.

Theoretical Background

The principles of Mayer's Cognitive Theory of Multimedia Learning (CTML) form a theoretical basis for this study. Theories that support CTML are Paivio's Dual Coding Theory (1986) and Swellers' Cognitive Load Theory (2005). According to Sweller, Cognitive load theory has positive implications for multimedia learning. Mayer (2005) deals with the different principles of multimedia learning. Some of the principles that are applied in this study are i) Multimedia Principle: people learn from words and pictures rather than words alone, ii) Modality Principle: effective learning takes place when the input is given in different modes, iii) Coherence Principle: people learn better when extraneous material is excluded, iv) Signalling Principle: people learn better when cues that highlight the organization of the material is added, v) Temporal Contiguity Principle : people learn better when corresponding words and pictures are presented at the same time rather than in succession, vi) Segmenting Principle – people learn better when a multimedia lesson is presented in user-paced segments , vii) Pre-training Principle: people learn more deeply when they receive pre-training on the use of multimedia tools, and viii) Personalization Principle: people learn effectively from a multimedia presentation when it is personalized. The principles applied in the present study appear to be a promising mandate for designing multimedia tasks at tertiary level ESL writing classrooms.

Table 1

Importance of Mayer's principles

Multimedia principle	Individuals can effectively learn through visual context. Multimedia principle greatly facilitates learners' understanding. Lessons containing words (printed or spoken) and pictures (illustrations, photos, animations, or video) enhance learning.
Modality principle	Most learners easily acquire information if it is presented in both visual and auditory mode. For example, if the instructor wants to teach his students on how to interpret a statistical bar graph he is advised to use visual and audio narration instead of visual and onscreen text.

Coherence principle	Eliminating unnecessary information in a multimedia presentation helps the learner understand the content. Adding interesting but irrelevant materials to multimedia courses may distract the learner.
Signalling Principle	Signalling principle guides the learners to focus on the key elements in the lesson thereby reducing the cognitive overload on the learner. It helps in understanding the concepts.
Temporal contiguity principle	Learners learn effectively when text and visuals are presented concurrently rather than successively. For example, presenting a text and visual in the same slide is better than presenting them in two different slides.
Segmenting Principle	If complex lessons are broken down into smaller parts (bite size segments) and presented one at time learning will take place in an effective manner.
Pre-training principle	Pre-training can help users to manage the processing of complex materials. For example, pre-training on how to use multimedia software makes it easier for the beginners to use it in the classroom.
Personalization Principle	If multimedia presentations are customized according to the needs of the learners, they would perform better.

Source: Extracted from Clark, R. C., & Mayer, R. E. (2011)

Research Questions and Hypothesis

The present study is guided by the following research questions:

What is the difference in performance levels of learners who are taught writing using multimedia tools compared to the learners who are taught writing using traditional methods?

What is the extent of improvement in task focus, cohesion and coherence, lexical resource and grammatical resource after multimedia intervention?

In alignment with the research questions, the hypothesis was formulated as, “incorporating multimedia tools using the process approach leads to discernible improvement in writing skills”.

Methodology

This study is a part of doctoral research that investigated the efficacy of the process approach to writing in a multimedia supported environment. A true experimental design consisting of a control group and an experimental group was employed in this study. Both the groups were subjected to a randomized pretest and posttest. The pretest was conducted before instructional phase and the posttest was administered after instructional phase. The performance of both the control and the experimental group was analyzed based on the posttest scores. "The intention of experimental research is the production of results that are objective, valid and replicable. It usually involves truth seeking as opposed to opinion seeking." (Gray, 2013, p.131).

Sampling Procedure

This experimental study, approved by the institutional review board (IRB), was conducted at B.S. Abdur Rahman University in Southern India. It is a 33-year-old institution offering Engineering, Science and Management programmes. It is ranked 3rd among the engineering institutions in the state by National Institutional Ranking Framework (NIRF). Using random sampling, 41 participants were selected from year 1 Civil Engineering B and 40 participants from Year 1 Civil Engineering A. In accordance with IRB policies, all participants gave informed consent after learning the purpose, procedures, duration, and potential benefits of the study.

Participants were 18-19 years old. Eleven students from the control group and 10 from the experimental group did not complete all phases of the experiment. Thus, for uniformity, the data of 30 participants from each group was analyzed. Both the groups were initially given a 30-minute orientation on report writing. Next, each group was given 30 minutes to write a report based on an example from the textbook. The objectives of the pre-test were i) to diagnose their proficiency levels and ii) to ensure homogeneity between the two groups. Pretest scores indicated similar means for both groups. After ensuring parity between the control and experimental groups, the experiment was conducted over a period of 5 weeks comprising 15 instructional hours per group.

Evaluation methods

In order to test the effectiveness of the intervention, pretests and post tests were conducted for both the experimental and the control groups. Proficiency scales used by IELTS test was adapted from Hutchinson and Waters (1987). The public version of IELTS band descriptors (2013) for task-1 writing was used as an evaluation guideline. Since the students were assessed on report writing, task-1 rubric was chosen for evaluation.

Description of the grade and credit structure

The test performance was assessed based on four parameters such as i) task focus, ii) cohesion and coherence, iii) lexical resource and iv) grammatical range and accuracy. Task focus refers to the appropriate length and specificity of the answer; coherence refers to the logical organization of the paragraph and cohesion to the connection of ideas using linking words; lexical resource refers to the range of vocabulary; grammatical resource implies writing error-free sentences. A maximum of 5 points and a minimum of 0.5 points were awarded for each parameter. The IELTS band descriptors have a maximum of nine parameters but for feasibility in quantifying the data in SPSS, it was changed to 10 descriptors. The grade range was also added for precise specifications. They are indicated in the table below:

Table 2

The grade range

S.No.	Description of marks	Grade
1	Advanced user-5 Points	A
2	Expert user-4.5	B
3	Very good user-4	C
4	Good user-3.5	D
5	Competent user-3	E
6	Modest user-2.5	F
7	Limited User-2	G

8	Extremely limited user-1.5	H
9	Intermittent User-1	I
10	Non User-0.5	J

Source: Adapted from Hutchinson and Waters and modified. (p. 150)

There are only subtle differences between the users. The difference between an advanced and expert user is presented here as an example. In task achievement, an advanced user satisfies all the requirements of the task by presenting a fully developed response whereas an expert user covers all requirements of the task sufficiently. In cohesion and coherence, an advanced user skillfully manages paragraphing whereas an expert user uses paragraphing sufficiently and appropriately. In lexical resource, an advanced user uses a wide range of vocabulary with a natural and sophisticated control of lexical features whereas an expert user uses a wide range of vocabulary with rare errors in spelling or word formation. In grammatical range, an advanced user uses a wide range of vocabulary with full flexibility whereas an expert user uses a wide range of structures with occasional errors. (To know the difference between other users see the rubric in Appendix I).

The concrete examples explaining the constructs such as task achievement, cohesion and coherence, lexical resource and grammatical resource and examples explaining what constitutes each mark is given in Appendix II. None of the answer scripts were awarded a band of 5 or 4.5. Hence, the extracts of answer scripts with a whole band of 4, 3, 2 and 1 are reported along with the examiner's comments.

Procedure for Data Analysis

The data was analyzed using IELTS, task-1 rubric. An independent sample t-test was run using SPSS for validation of results. The significance level of the t-test was set at an alpha value of 0.05.The t-test values of the control group and experimental group were compared to recognize the impact of the multimedia intervention and to measure the level of improvement among the experimental group.

Details of the experiment

Initially, the control group was exposed to traditional instruction. (In this context traditional instruction refers to the use of conventional teaching aids such as (a blackboard, textbooks, and visuals.) The experimental group was exposed to multimedia instruction. The classroom was equipped with a multimedia projector, computers, visual dictionaries and multimedia speakers. The experimental study was conducted in the language lab which had 37 networked systems.

The teaching stage

The students were taught about an accident report. The steps followed during the teaching phase of both the control group and the experimental group is summarized below.

Phase –I

In phase one, the teacher had oral discussions about the significance of reports to the control group. A discussion on the kinds of accidents that take place at the construction sites was initiated. The experimental group was exposed to a video clip on an accident at a construction site. (Blade runner, 2009). Subsequently, a song named "A brick layer's song" sung by Corries (2010) was played from YouTube. The song is about a construction worker who was grievously injured at work when he was asked to clear the bricks on the fourteenth floor. After the song was played, there was a discussion about the accidents they witnessed in the video clips. The modality principle (effective learning takes place when the input is given in visual and auditory mode) was applied in phase one.

Phase-II

The control group was instructed to read the model reports from the prescribed textbook whereas the students of the experimental group were encouraged to browse the archived news reports.

Hyperlinks to the newspaper archives were given. The multimedia principle (people learn from words and pictures rather than words alone) was applied during this phase.

Phase-III

As a prewriting activity, the control group was exposed to a brainstorming session. Followed by that, the students discussed their views in small groups. The experimental group was asked to collaborate and create a multimedia mind map using the mind mapping tool 'Edraw Max' (Version V7.9; 2014). A group project on mind maps was given. The students were encouraged to incorporate visuals into the mind maps they created. The multimedia principle that was applied in phase-II was applied in phase-III also.

Phase-IV

As a vocabulary building exercise the control group was asked to discuss in groups and generate a word list pertaining to the writing task. Each group created a word list and shared it with the rest of the class. The experimental group discussed the words related to the task and created word webs in groups using the tool 'Wordle'. It is available at www.wordle.net. They were also encouraged to use 'Snappy words' an online visual thesaurus which gave a graphical and audio narration of words (www.snappywords.com). Modality principle was applied in this phase. After a discussion on word level tasks attention was given to discourse level tasks.

Phase-V

The students of the control group were exposed to discourse markers for achieving better cohesion in writing. A list of discourse markers was written on the board. Some follow-up tasks for reinforcement were given to the control group. The experimental group was exposed to a presentation on discourse markers using the presentation software 'Prezi' (desktop Version 5.2.7)

(www.prezi.com). The presentation was shared using Wikispaces and they were asked to complete them.

Phase-VI

During this stage the control group was asked to organize their ideas using pen and paper whereas the experimental group was asked to organize their ideas using multimedia graphic organizers.(http://thinkport.org/graphic-organizers/). The Signalling principle (people learn better when we add cues that highlight the organization of the material) was applied in phases V& VI. According to Mayer (2005), exposing the learners to the key elements in the lesson and guiding them to develop connection is a key concept in the Signalling principle (p.109)

Phase-VII

The control group was exposed to grammar components such as active to passive construction and the use of tenses using a blackboard. The students in the experimental group were instructed using interactive online grammar lessons. The exercises are found at http://www.englishmedialab.com/grammar.html.The grammar components were taught in different segments. One session for simple present tense forms another session for past forms and so on. The segmenting principle (people learn better when a multimedia lesson is presented in user-paced segments rather than as a continuous unit) is applied here.

Phases-VIII&IX

The control group was asked to write the first draft of reports using pen and paper whereas the experimental group created their first draft using Wikispaces. The control group was given a checklist on peer editing. They were asked to exchange the drafts and revise them using the checklist. The peer editing checklist was uploaded to the Wikis for the experimental group. They were encouraged to revisit the materials such as mind maps, word webs and 'Prezi' presentations

when writing their drafts. The coherence principle states that people learn better when extraneous material is excluded. In alignment with this principle, materials beyond the context of the teaching item were avoided.

Phases-X &XI

The evaluation rubric was given to the control group. Since it was a report writing task IELTS rubric for task one was used. For the experimental group the rubrics were uploaded to the wikis. The control group wrote the final draft in pen and paper whereas the experimental group used Wikis.

Phase-XII

The written feedback was given in the answer scripts of the control group. On the other hand, feedback to the experimental group was given using 'Tiny Take' a personalized screen capture software (www.tinytake.com). 'Tiny take' allows the evaluator to screen capture the errors in the students' scripts and comment on it. Liu & Brown (2015) claim that online reflective tools support teacher's feedback practices. The Personalization principle was applied during this phase. It states that people learn better from a multimedia presentation when it is personalized. A brief description of the tools used and the rationale for using the tools is given in the subsequent part of this paper.

Description of the multimedia tools and rationale

According to Roy & Crabbe (2015), students today naturally possess digital literacy enabling easy ICT integration. True to this statement, the students easily understood the interface and navigation features of the software used in the study. The students of the experimental group were given pre-training on the use of the multimedia tools. A brief technical description of the tools and the web-links are mentioned below. However, the steps involved in using the tools are not discussed as it is beyond the scope of the paper.

1. **'Edraw'** is a mind-mapping tool, which has a variety of templates, and options to create interactive mind maps. It is user-friendly and provides various templates to create brainstorming diagrams, project timeline etc. It provides visual impact and scaffolding during writing tasks. The full range of functions is given in the user guide at (https://www.**edraw**soft.com/download/**edrawmanual**.**pdf**)
2. '**Wordle'** provides a good starting point for discussing vocabulary related to the context. Word clouds could be created in any shape. To create word webs using 'wordle' visit www.wordle.net/create
3. **'Snappy words'** is an online interactive thesaurus and dictionary that helps the learners to form word associations and synonyms. It helps the learner to choose appropriate words during writing. (www.snappywords.com)
4. **'Wikispaces'** Recently there is a surge of research on the efficacy of wiki spaces in a writing classroom. It not only helps in scaffolding and collaboration but also enables sharing of multimedia content such as videos, audio clips, and visuals with the members in the group. www.wikispaces.com.
5. **'Prezi' –**Prezi presentations are visually rich and enable the user to seamlessly integrate multimedia content such as visuals, audio, and video clips. In order to learn how to use Prezi, the tutorials can be accessed in www.prezi.com/learn.
6. '**Tiny take' –**Although there are several free screen capture software, 'Tiny take' has a very easy to use interface. The evaluator can screen capture the writing task of the students and comment on their performance.www.tinytake.com.

Analysis of Results

The data was analyzed regarding four aspects of writing such as task focus, cohesion and coherence, lexical resource and grammatical resource. The IELTS rubric used for the test evaluation increased the objectivity and validity of the analysis. Descriptive statistics such as mean and inferential statistics such as confidence interval and t-test were used for analysis.

Marking procedure

The scripts were marked by raters who were not aware of the background of the candidates. The pretest answer scripts were marked by a senior professor who is a certified IELTS examiner. The posttest scripts were marked by an Associate professor who is also a certified IELTS examiner. Both of them have undergone periodic training for examiners. Only one rater examined the scripts of the pretest and posttests.The raters were not aware that they were marking pre-tests or post-tests.

The tables and graph illustrated below deals with the research questions that were raised earlier in the study. The grade values are mentioned in the first row of the table. The categories such as task focus, coherence and cohesion, lexical resource and grammatical resource have the maximum mark allotment as 5.The minimum allotment is 0.5 points. 5 points refer to the advanced user and 0.5 refers to non-user. The description of the grade and the credit structure is given in table 1 of the methodology section. The numeric values in the tables below represent the number of candidates who have scored the respective marks. The percentage given below the numeric values indicates the percentage of the candidates who are in that particular range.

Comparative analysis of the control group

Table 3

Pretest: Control group

Grade	A=5	B=4.5	C=4	D=3.5	E=3	F=2.5	G=2	H=1.5	I=1	J-0.5	Mean
Task focus	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	6 (20.0%)	7 (23.3%)	12 (40.0%)	5 (16.7%)	0 (0.0%)	0 (0.0%)	4.46
Coherence &Cohesion	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.3%)	1 (3.3%)	11 (36.7%)	12 (40.0%)	3 (10.0%)	2 (6.7%)	0 (0.0%)	4.30
Lexical Resource	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (6.7%)	10 (33.3%)	11 (36.7%)	7 (23.3%)	0 (0.0%)	0 (0.0%)	4.23

Grammar Resource	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (6.7%)	2 (6.7%)	13 (43.3%)	8 (26.7%)	5 (16.7%)	0 (0.0%)	3.60

Table 4

Posttest: Control group

Grade	A=5	B=4.5	C=4	D=3.5	E=3	F=2.5	G=2	H=1.5	I=1	J-0.5	Mean
Task focus	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	7 (23.3%)	10 (33.3%)	11 (36.7%)	2 (6.7%)	0 (0.0%)	0 (0.0%)	4.73
Coherence &Cohesion	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.3%)	6 (20.0%)	7 (23.3%)	11 (36.7%)	4 (13.3%)	1 (3.3%)	0 (0.0%)	4.53
Lexical Resource	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (13.3%)	10 (33.3%)	12 (40.0%)	4 (13.3%)	0 (0.0%)	0 (0.0%)	4.46
Grammar Resource	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.3%)	1 (3.3%)	6 (20.0%)	11 (36.7%)	7 (23.3%)	4 (13.3%)	0 (0.0%)	3.86

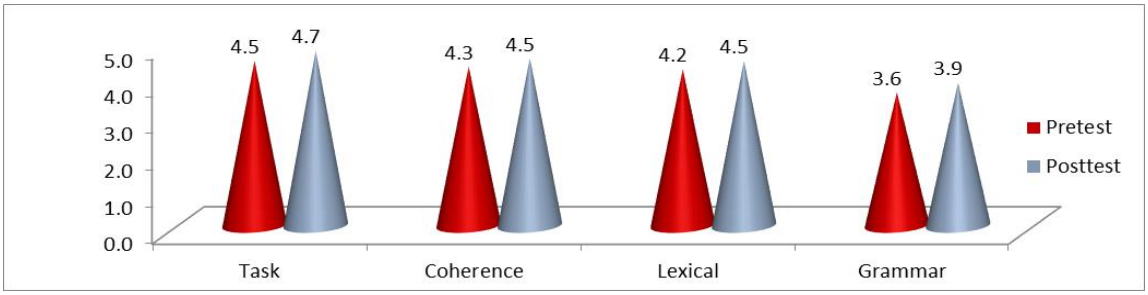

Figure 1. Comparative graph of pretest and posttest of control group

Table 2 and Table 3 represent the mark coding procedure. The control group revealed a marginal improvement in the performance on all the four parameters. In task focus, the mean scores have improved from 4.4 to 4.7.The mean score has improved from 4.3 to 4.5 in coherence and 4.2 to 4.5 in lexical resource. The mean scores have increased from 3.6 to 3.9 in grammatical resource. The mean scores indicated that the significance level in control group is marginal in all four parameters.

Comparative analysis of pretest and post test scores of the experimental group

Table 5

Pretest -experimental group

Grade	A=5	B=4.5	C=4	D=3.5	E=3	F=2.5	G=2	H=1.5	I=1	J-0.5	Mean
Task	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	8 (26.7%)	6 (20.0%)	11 (36.7%)	4 (13.3%)	1 (3.3%)	0 (0.0%)	4.53
Coherence	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.3%)	5 (16.7%)	8 (26.7%)	11 (36.7%)	4 (13.3%)	1 (3.3%)	0 (0.0%)	4.50
Lexical	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.3%)	4 (13.3%)	4 (13.3%)	12 (40.0%)	9 (30.0%)	0 (0.0%)	0 (0.0%)	4.20
Grammar	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (6.7%)	2 (6.7%)	13 (43.3%)	8 (26.7%)	5 (16.7%)	0 (0.0%)	3.60

Table 6

Posttest- experimental group

Grade	A=5	B=4.5	C=4	D=3.5	E=3	F=2.5	G=2	H=1.5	I=1	J-0.5	Mean
Task	0 (0.0%)	0 (0.0%)	4 (13.3%)	10 (33.3%)	8 (26.7%)	5 (16.7%)	2 (6.7%)	0 (0.0%)	1 (3.3%)	0 (0.0%)	6.16
Coherence	0 (0.0%)	0 (0.0%)	2 (6.7%)	4 (13.3%)	9 (30.0%)	5 (16.7%)	9 (30.0%)	1 (3.3%)	0 (0.0%)	0 (0.0%)	5.40
Lexical	0 (0.0%)	0 (0.0%)	2 (6.7%)	5 (16.7%)	9 (30.0%)	4 (13.3%)	8 (26.7%)	2 (6.7%)	0 (0.0%)	0 (0.0%)	5.43
Grammar	0 (0.0%)	0 (0.0%)	1 (3.3%)	0 (0.0%)	5 (16.7%)	5 (16.7%)	12 (40.0%)	5 (16.7%)	2 (6.7%)	0 (0.0%)	4.23

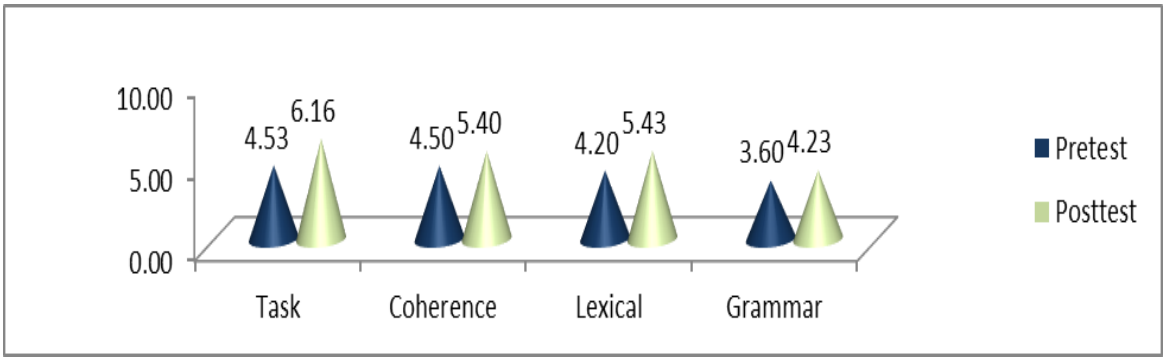

Figure 2. Comparative graph of pretest and posttest of experimental group

Table 7

Mean difference and C.I of experimental groups

S.No	Description	Mean	SD	95% Confidence Interval of the Difference (C.I)
1	Task Focus	1.63	0.96	1.27 – 1.99
2	Coherence& Cohesion	0.90	0.75	0.61 – 1.18
3	Lexical Resource	1.23	0.72	0.96 - 1.50
4	Grammatical resource	0.63	0.76	0.34 – 0.91

Analysis of the experimental group

Table 4 represents the pretest of the experimental group and table 5 represents the posttest of the experimental group. Descriptive statistics such as mean and standard deviation was used to assess the degree of improvement between the pretest and posttest. Table 6 represents the mean difference and standard deviation of the pretest and posttest of the experimental group.Figure-3 represents the confidence interval between the pretest and the posttest. The 95% confidence interval was used to estimate the mean values of various aspects such as task focus, cohesion and coherence, lexical resource, grammatical range and accuracy. The confidence interval indicates 95% certainty that the mean for the entire population of the experimental group falls within this range. The analysis of all four parameters is described below.

Task focus

The variation in mean scores of the posttest for the experimental group was much higher than the control group. In task achievement, significant differences were noticed in the mean scores as it progressed from 4.53 to 6.16. The confidence interval is 1.27-1.99. The CI reveals 95% certainty of the population mean. Compared to other parameters the improvement in task focus is distinct.

Cohesion and Coherence

It is evident from the posttest that the performance has improved in cohesion and coherence. The learners were able to synthesize their ideas and present them sequentially. The overall organization of ideas was also much better compared to the pretest. The mean for coherence and cohesion increased from 4.50 to 5.40. The confidence interval of 0.61-1.18 indicates the significance.

Lexical resource

In lexical resource, the improvement is quite evident as the mean scores raised considerably from 4.20 to 5.43. The confidence interval is 0.96-1.50. The performance in posttest revealed a considerable improvement in both the range and accuracy of words.

Grammatical range and accuracy

The analysis of grammatical range and accuracy suggests statistically significant difference as the mean scores progressed from 3.60 to 4.23. However, the level of improvement was lower than the other parameters. The results indicate that multimedia integration has made only a marginal difference in the improvement of grammatical competency. The confidence interval of 0.34-0.91 confirms this observation. The confidence interval of the difference between the pretest and posttest in all four parameters is more than 0. Hence, it is clear that the differences between both pretest and posttest are significant.

Table 8

Analysis of T-Value and two tailed 'P' Value

Assessment Parameters	T –Value Control group	T-Value experimental	Sig 2-tailed P value Control Group	Sig 2-tailed P value Experimental Group
Task Focus	-1.0992	-5.513	0.2762	<0.001
Coherence & Cohesion	-0.8051	-3.8369	0.424	<0.003
Lexical Resource	-1.009	-3.7576	0.321	<0.004
Grammatical Resource	-0.7142	-2.2272	0.478	<0.0298

T-value if closer to 0 indicates no significant difference. A higher t-value (either positive or negative) indicates evidence of statistical significance. Similarly, if the p-value is very low null hypothesis is rejected. According to Green & Salkind, (2010), the larger the t-value and smaller the p-value the greater the evidence against the null hypothesis. Table-7 indicates a higher t-value and a lower p-value for the experimental group. The significance level of the t-test was set at an alpha value of 0.05 as it is the commonly used measurement in educational research. The t-test values of the experimental group were less than 0.05 in all the parameters except grammatical resource. On the other hand, it is more than 0.05 for all the four parameters in the control group. Based on the observation of t-test it is evident that the difference in the experimental group is statistically significant.

Discussion

The study has revealed that the experimental group has outperformed the control group. The improvement in task focus in the experimental group could be attributed to the video clips, songs and mind mapping tools. The improvement in cohesion and coherence could be related to the

'Prezi' presentation on discourse markers and the related follow-up tasks. The improvement in lexical resource could be due to the integration of web-based tools such as 'Wordle' and online visual thesaurus. Another interesting finding is that the improvement in the grammatical resource is not statistically significant. The positive impact of multimedia instruction is evident in all the other three parameters. Hence, the hypothesis that "incorporating multimedia tools using process approach leads to discernible improvement in writing skills" is proved in three parameters such as task focus, cohesion and coherence and lexical resource. The findings of this study corroborate to the findings of the international literature in this area. None of the earlier studies has tested the efficacy of CTML principles for the design of multimedia tasks. The author believes that the findings of this study would contribute to the knowledge base in L2 writing. It is expected to have promising implications for classroom practice.

Limitations and scope for further study

During multimedia integration, the students encountered technical problems. Sometimes, they had to start all over again due to interrupted connectivity. Some students were proficient in the use of computers whereas some students had only basic operational knowledge. So, the even pacing of the tasks was a constraint. The analysis is based on a limited corpus of data (60 samples). An intensive study of a large sample size and a varied population could yield an authentic result. A short time span (five weeks) was required for this study. An extended time span would have been even more effective. The material design was limited to only one genre. The study could also be extended to other genres of writing. The theoretical base was restricted to the principles of Mayer's CTML. There are other variables such as the participants' familiarity and proficiency in computers skills which could have influenced the test performance. This was not studied as a variable. Another major limitation of the study is that the scripts were evaluated by only one rater. Further research with a larger population, extended time span, more variables and on different genres of writing would be some interesting areas to explore for further researchers.

Conclusion

Literature spanning over the last ten years indicates that the process approach to writing is comprehensively researched. Pritchard& Honeycutt (2007) in their well-researched work claim that the process approach is an effective practice in writing instruction. Although the process approach to writing is effective at the tertiary level it can be repackaged according to the needs of the digital age. The Indian department of higher education (2014) reports that "the higher education in India has taken initiatives to administer the national mission of education through ICT" (p.2). In this context, integrating multimedia for teaching L2 writing could be a viable option. The multimedia framework suggested in this paper is expected to provide the learners a stimulating environment to write. Educators at the tertiary level may find these tools useful for teaching writing. Content analysis of the test performance exposed the positive impact of multimedia integration. The results of the t-test have indicated that the students have made significant progress in writing skills. Despite a small sample size, the positive results indicate that multimedia integration in writing classrooms could be a panacea for overcoming the writing difficulties. The author believes that choosing appropriate tools and meticulous design of tasks in the light of theories such as CTML would certainly enhance the writing pedagogy at tertiary level. The integration of multimedia in writing classrooms may not yield immediate results. However, if such practices are sustained for a long period of time, it will lead to effective learning outcomes. From this small scale experimental study, the researcher concludes that the instructor can help their students to demonstrate better writing skills in a multimedia supported environment.

References

Bird, J. and Edwards, S. (2014). Children learning to use technologies through play: A Digital Play Framework. *British Journal of Educational Technology*, 46: 1149–1160. doi: 10.1111/bjet.12191

Bikowski, D., & Vithanage, R. (2016). Effects of web-based Collaborative writing on individual

L2 writing development. *Language Learning & Technology*, *20*(1), 79–99.

Bladerunner. (2009, December 14).Funny Construction Accidents [Video file]. Retrievedfromhttps://www.youtube.com/watch?v=jQytLMd-_Dc

Charles M. Mueller and Natalia D. Jacobsen (2016). A comparison of the effectiveness of EFL students' use of dictionaries and an online corpus for the enhancement of revision skills. ReCALL, 28, pp 3-21. doi:10.1017/S0958344015000142.

Chiu, H. L. (2015). Materials Design and Pedagogy for Technology-Enhanced Language Learning. *International Journal of Computer-Assisted Language Learning and Teaching (IJCALLT)*, 5(1), 22-34. doi: 10.4018/IJCALLT.2015010102.

Clark, R. C., & Mayer, R. E. (2011). E-learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning (3rd ed.). San Francisco, CA: John Wiley and sons.

Conole, G. (2013). Designing for Learning in an Open World, Springer, New York.

Corries. (2010, March 1). The Bricklayer's Song (Video file) Retrieved from https://www.youtube.com/watch? v=38v0Kj86MhA

Graham, S., McKeown, D., Kiuhara, S., & Harris, K. R. (2012).A meta-analysis of writing instruction for students in the elementary grades. *Journal of Educational Psychology*, 104(4), 91–109. doi: http://dx.doi.org/10.1037/a0029185

Graham, S., &Perin, D. (2007).Writing Next-Effective strategies to improve writing of adolescents in middle and high schools. A Report to Carnegie Corporation of New York. *Alliance for Excellent Education.*

Gray, D. E. (2013). *Doing Research in the Real World*. 3rd ed. London: SAGE Publications.

Green, S. B., & Salkind, N. J. (2010). *Using SPSS for Windows and Macintosh: Analyzing and understanding data*. Prentice Hall Press.

Hutchinson, T. and Waters, A. (1987). *English for Specific Purposes*. Cambridge: Cambridge University Press.

IELTS Task 2 Writing Band Descriptors. (2013). Retrieved from (n.d.). https://takeielts. britishcouncil.org/sites/default/files/IELTS_task_2_Writing_band_descriptors.pdf

Indian Department of Higher Education, India, Ministry of Human Resource Development:

National Mission on Education through Information and Communication Technology (NMEICT). (2015). Retrieved from mhrd.gov.in/sites/upload_files/mhrd/files/document-reports/Part1.pdf

Jeyaraj, J. (July 2005). Technical communication and cross-cultural miscommunication: usability and the outsourcing of writing. Proceedings of the IEEE Professional Communication Conference. Issue, 10-13, pp: 92 – 100. Limerick, Ireland.

Keppell, M., Suddaby, G., & Hard, N. (2015).Assuring best practice in technology-enhanced learning environments. *Research in Learning Technology, 23*. doi: http://dx.doi.org/10.3402/rlt.v23.25728

Kessler, G., Bikowski, D., & Boggs, J. (2012).Collaborative writing among second language learners in academic web-based projects. *Language Learning & Technology, 16*(1), 91-109.

Lakkala, M. & Ilomaki, L. (2015). A case study of developing ICT-supported pedagogy through a collegial practice transfer process. *Computers& Education*, *90*, 1-12. doi: 10.1016/j.compedu.2015.09.001

Leki, I. (1991, April). Teaching second language writing: where we seem to be. *English teaching forum* (Vol. 29, No. 2, pp. 8-11).

Liu, Q.& Brown, D. (2015).Methodological synthesis of research on the effectiveness of corrective feedback in L2 writing. *Journal of Second Language Writing, 30*, 66-81. doi: 10.1016/j.jslw.2015.08.011

Mayer, R. (2005). "Cognitive theory of multimedia learning. Mayer, R. (ed.), *Cambridge handbook of multimedia learning*, 2nd ed, New York: Cambridge University Press, p.169–182.

Nerantzi, C., & Gossman, P. (2015). Towards collaboration as learning: evaluation of an open CPD opportunity for HE teachers. *Research in Learning Technology, 23*. doi: http://dx.doi.org/10.3402/rlt.v23.26967

Paivio, A. (1986). *Mental representations: A dual coding approach.* Oxford, England: Oxford University Press.

Parr (2013). Classroom Assessment in Writing. In: *Sage Handbook of Research on Classroom Assessment*, ed J. H. McMillan, Los Angeles, CA: SAGE Publications.

Pritchard, R. J., & Honeycutt, R. L. (2007). *Best practices in implementing a process approach to teaching writing*. S. Graham, C.A. MacArthur, & J. Fitzgerald (Eds.), Best practices in writing instruction (pp. 28-49). New York: Guilford Press.

Roy, D. & Crabbe, S. (2015). Website analysis in an EFL context: content comprehension, perceptions on web usability and awareness of reading strategies. *ReCALL*, 27(02), 131-155. doi: 10.1017/S095834401400024X.

Storch, N. (2011). Collaborative Writing in L2 Contexts: Processes, Outcomes and Future Directions. *Annual Review of Applied Linguistics*, 31, p.275–288. doi: 10.1017/s0267190511000079.

Sweller, J. (2005). Implications of cognitive load theory for multimedia learning. In R. E. Mayer (Ed.), *The Cambridge Handbook of Multimedia Learning.* New York: Cambridge University Press.

Tour, E. (2015). Digital mindsets: teachers' technology use in personal life and teaching. *Language Learning and Technology* [P], 19(3), 124-139.

Truong, M. and Zanzucchi, A. (2012). Going Beyond the Traditional Essay: How New Technologies are Transforming Student Engagement with Writing Outcomes. *Cutting-edge Technologies in Higher Education*, p.263–288.doi:10.1108/s2044-9968(2012)000006b012.

White, R. & Arndt, V. (1991): *Process Writing*. London and New York: Longman.

Appendix I

Assessment Rubrics-Test-1

Band	Task achievement	Coherence and cohesion	Lexical Resource	Grammatical Resource
5	Fully satisfies all the requirements of the task. Clearly presents a fully developed response	Uses paragraphing skillfully	Uses a wide range of vocabulary with a natural control of lexical features	Uses a range of structures with accuracy
4.5	Covers all requirements of the task sufficiently. Presents and illustrates key features clearly	Sequences information and ideas logically. Uses paragraphing sufficiently.	Uses a wide range of vocabulary, may produce occasional errors in word choice and spelling	Uses a range of structures with occasional errors
4	Covers task requirements	Uses a range of cohesive devices. Maybe some underuse/Overuse	Occasional errors in word choice and spelling.	Good control of grammar and punctuation with few errors.
3.5	Adequately addresses key features, but details may be irrelevant.	Cohesion between sentences may be faulty at times.	Some errors in word formation and spelling but may not impede communication.	Uses a mix of simple and complex sentence forms. Makes few errors in grammar and punctuation
3	Addresses the task; the format may be inappropriate. No data to support description.	Presents information with some organization, but may be repetitive	Uses limited vocabulary with noticeable errors	Uses limited range of structures with frequent grammatical errors and punctuation

2.5	Does not address all key features and format may be inappropriate.	Ideas not coherent. Cohesive devices may be inaccurate	Repetitive vocabulary and limited control of word formation.	Limited range of structures. Faulty punctuation.
2	Limited ideas that is repetitive.	No logical relationship between ideas.	Limited vocabulary and errors that distort the message.	Errors in grammar and punctuation that distort meaning.
1.5	Answer unrelated to task.	Little control of organizational features	Extremely limited vocabulary	Poor use of sentence forms
1	Answer completely unrelated.	Fails to communicate any message.	Can use only a few isolated words	Cannot use sentence forms at all.
0.5	Just makes an attempt.			

Appendix 2
Examiner's comment and extracts from the answer scripts of the candidates

Construct	Examiners' comment	Extracts from the answer scripts.	Marks
Task Focus	The report meets the task requirements. The beginning is suitable and sets up the context of the report. The candidate has described the accident with specific and appropriate reasons. He has presented the key features of the task clearly. Although the report meets the task requirements the word limit is slightly inadequate.	A construction accident occurred on Wednesday, March 1, 2016 near Chennai at approximately 12.30 P.M. The concrete slab suddenly collapsed. As a result, two workers suffered fatal injuries. There were immediately taken to a nearby hospital. The concrete overload in the slab could have triggered the fall. Proper preventive measures should be taken to avert such accidents in future. Necessary training and proper supervision are essential.	**4**
	The candidate has addressed the task but, there is insufficient data to support description. The candidate discusses the reason but it is not specific. The content could have been easily extended.	Two construction workers were injured when the slab fell on them. The supervisor was negligent. They workers sustained severe injuries. But they are not life threatening. The victims are treated at a nearby hospital.	3
	Limited and repetitive ideas. The reader is not completely informed about the accident. He has not presented any reasons to support his report.	Construction workers were hurt. The injury was serious. They had fractures. They were taken to a hospital.	2
	Irrelevant answer. The candidate has not understood the task. He presents personal opinions instead of facts.	Planning is important. Without planning there is no building. Big and small building needs plan.	1

Cohesion and coherence	Logically organizes information and ideas. There is a blend of short and long sentences. The answer is coherent and there is overall clarity. Ideas are presented in sequence and cohesive devices are slightly overused.	Since the workers are experienced there were left unsupervised. As a result, they were negligent in their work. Actually, the inadequate supervision has led to this fatal injury. Besides the physical injuries to the labourers, the company incurred a huge financial loss. The supervisors should ensure that the workers are not only experienced but also accountable for whatever happens.	4
	Organization is better, but the information in the first part is repetitive. "By means of "is an Inappropriate cohesive device.	During filling one of the slabs with lime stone, the supporting structure collapsed. Apparently, the lime stone was excessively filled. Too much of limestone in the slab led to the collapse. By means of the slabs' collapse, two employees were killed and two others were badly injured. Immediately they injured were taken to a nearby hospital and are currently undergoing treatment.	3
	No logical relationship with ideas. The candidate has exhibited very little control of organizational features. The message lacks a logical flow.	The beams fell. The slab fell. A few were injured. The beams were made of iron. The injured were taken to the hospital.	2
	The content is difficult to follow. It is not presented in a sequence.	The construction site located in mint street. All trapped. No rescue. Everyone shock by accident. The scaffolding broke. It took place 12.00 P.M.	1
Lexical Resource	The candidate has exhibited a range of vocabulary, but there are inaccuracies in word choice. The candidate could have used risk assessment instead of risk calculation and maintenance instead of preservation.	The supervisor at the site did not conduct a full risk calculation to find the potential hazards. Proper inspection procedures, periodic training and equipment preservation could avert such life threatening, occupational hazards.	4

	Limited vocabulary with noticeable errors and occasional error in spelling. Spelling error-deel; Inappropriate word choice-urgency, take remedy	It is important to take steps and deel with urgency within a specified time frame. It is important to find reasons to stop future danger and take remedy	3
	Limited vocabulary and errors in word choice that distort the message.	The worker not proper to work in that situation. They collide lead to head injury. The injured were transported to the nearest clinic.	2
	The candidate has just attempted a few words. But, they are inappropriate	The wall break and, I look it fall. The hurt people are cared in hospital.	1
Grammatical resource	The candidate shows a good control of grammar and punctuation. However, the use of tense is inappropriate in the first and the last sentence. There is a mix of simple and complex structures in the script.	Around 7.00 P.M on Wednesday, a group of workers mostly men was filling the frames with concrete mix. Suddenly, the scaffolding that was supporting the steel frames with the concrete mix collapsed leading to the fall of the structure. Some of the workers who were beneath the steel frames were also terribly injured in the incident. People, who were in the vicinity, quickly rushed to their rescue. The police personnel stated that none of the workers were provided with safety gear. The supervisor was absconding.	4
	Limited structures with grammatical errors. Few mistakes in grammar and punctuation. It does not affect the readability. Complex structures are not attempted. Tense error(is on a ladder) Article error(an high voltage)	Three workers were installing new roof gutters on a two storey building. Two of the workers were on the roof, the third one is on a extension ladder.) The worker on the ladder lifted the lower end of the gutter. The top end contacted the board of an high-voltage circuit. He fell from 20 feet.	3

	Errors in grammar and punctuation affects readability. Tense errors (was working) Prepositional errors (in the time) Article error (a premises)	Around 20 construction workers was working on a premises in the time of the accident. It is 9.00 A.M the incident happened	2
	The candidate has not presented the ideas in sentences. For example, he intends to say that wearing headgears could have saved the victims from head injuries. But, he conveys that the headgear could be protected. The candidate has used the wrong preposition, tense and improper word order.	No safe lead for injure. Headgear could be protected. Immediate they take hospital.	1