

Computer-Aided Teaching and Assessment of Reading Skills in English as a Second Language

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Abstract—The research article presents the observations and findings of a case study on the effectiveness that the computer-aided teaching of reading skill in English as a second language of first year engineering students. The research focuses on the students' reading skills such as concentration on the text, transforming information, perception of meaning in the content, reasoning, and retrieval of required information from text. The present research investigates the change in language abilities deduced from the reading in the context of delivery of reading units in English Proficiency course. The study was conducted during two academic semesters of first year engineering for the academic year 2021-22. The target group consists of four batches of twenty five students having Marathi as their mother-tongue. The study has been carried out with the help of a computer based language laboratory multimedia instructional tool having the standard functions in it. The Reading Skill units of the course were taught in the traditional classroom approach to the control group and the experimental group has received the same content in computer assisted language laboratory software tool that enhances teaching-learning experience. The analysis of study is based on the formation and implementation of assessment tests on a CG and an EG. The result analysis directs the researcher to conclude that the computer-aided language learning tools generate positive change in students' perception, transcoding, reasoning, and information recalling abilities.

Keywords—Second language, Language proficiency, Reading Skills, Teaching-learning techniques, Computer-assisted learning.

I. INTRODUCTION

Towards the end of twentieth century, the use of computer in teaching-learning has become visible in India. Initially, it was limited to technical institutions and was occasionally used to serve pedagogical purposes in schools and colleges in India. In the twenty-first century, language laboratories are equipped

with computerized systems along with the various learning tools those were earlier limited to portable cassette players and recorders. It has invited academicians' and language researchers' attention to measure the impact of use of technology on teaching-learning process. The objective of such studies was to map the learning outcomes in traditional teaching with the outcomes in computer assisted method. There, a control group (CG) has received instructional content from teachers in traditional mode e.g. a textbook taught by a teacher and an experimental group (EG) has received the same content through a computerised multimedia system. Students' assessment in both groups was accomplished in different forms, their results were analysed, and compared.

Some of the researchers strongly object the positive influence of use of media in teaching-learning process. According to Richard Clark (1994), the results of comparisons as evidences has been interpreted in wrong manner. Some of the researchers treat the use of multimedia as a mere tool in content delivery in the classroom but the experimentation in identifying impact of digitalized content on students is still going on. Gray Morrison (1994) recommends taking into consideration the consistent interactions between digital interface and the learner that could help in data generation, analysis and in identification of trends. Relevant studies have been conducted by some researchers in the context of teaching courses other than languages. Computer aided teaching-learning is one of the most effective additional tool when annexed with usual science and language courses (Fisher, 1983). It is indecisive either computer functions of information presentation or the teaching method used or both roped together are the influencing factors on student learning (Brown, 1985; Kulik, 1991).

The objective of the present study is to analyse the effectiveness of computer aided multimedia tools with respect to delivery and reception of reading skills in English as a second language among selected first year engineering students. Further, researcher compares traditional teaching of reading skills and its results with computer aided teaching-learning. Considering this, the present study has been

undertaken to evaluate the effectiveness of computer-aided tools in teaching-learning of reading skills. In the present society of information it is pivotal to have good reading comprehension ability.

The present research work records the positive influence of the computer aided teaching on the students learning English as a second language. The present study is based on the analysis of students' responses to read and respond type of tests designed to assess students' perception, transcoding, reasoning, and information recalling abilities in reading English as a second language. Additionally, read and reproduce as well as read and summarize type of classroom activities has been conducted to practice their reading skills. This experiment has been conducted for two subsequent semesters of the same academic year in an autonomous engineering institute. The pre-tests and post-tests have been administered on two hundred selected students from first year engineering classes out of which hundred students were the part of an EG and rest of the students were in CG. In this study SPSS14.0 statistical program, F-test, and one-way ANOVA is applied in the evaluation of the test results.

II. BACKGROUND

Most of the speakers of English language use it as a second or third language to communicate with the outside world. Listening and reading are receptive as well as speaking and writing are productive skills of a language. Reading is a reception skill of a language where the receiver constructs the meaning by decoding the message encoded by the sender. Reading helps in generation of new knowledge or in modification of existing information with a reader. Reading skill carries within it a subset of skills that according to Grellet (1981) and Howatt (2004) consist of deciphering of language script, finding main idea and distinguishing it from supporting information, application of background knowledge in fusing ideas, extracting specific information from the given text, retrieving information, concentration, and speed of reading.

Acquisition and further mastering the skills in English as a second language is the prime need of the present era. Today, intervention of digital tools in every facet of life cannot be avoided. There are a number of multimedia tools and platforms available with us to learn and to develop a language further. Language laboratory installation in educational institutes is one of them used for training and practice purposes. Teacher assisted or in self learning mode software graded content, pronunciation check, and online assessment with graphical analysis are some of the key features of these platforms.

Microsoft Windows and Microsoft Office provide basic common functions that help in the enhancement of the reading content. It has features are like resizing and formatting text, managing length of text line, spacing between two letters and lines, arranging pictures, graphics and drawings, managing text flashing time, and selection of background of the text. PowerPoint in Microsoft Office or Presentation in OpenOffice can be used to present reading text with incorporation of relevant images and animations on slides. With this a student can easily move to the next or previous slide. Use of these presentation tools and its features may help in extending the attention span of a reader resulting into improving subset of reading skill.

III. DESIGN OF THE EXPERIMENT

The sample consists of selected two hundred students of first year undergraduate engineering programs from an autonomous institution in Western Maharashtra. The students were chosen on the basis of random selection method. The selected students have completed their schooling in Marathi medium schools in towns. During the schooling, they have studied English as a compulsory subject up to twelfth standard. These students are further grouped equally into a CG and an EG.

Ability to communicate effectively and to engage in lifelong learning are two of the expected program outcomes for undergraduate engineering program. In the fulfilment of it, reading skills is one of the highly required skills. To address these program outcomes, first year engineering curriculum in the institute has introduced English Proficiency – I and English Proficiency – II courses in the semester I and II respectively. The course English Proficiency – I has three units on reading skills as Reading Skills – I (Read and reproduce [oral]), II (Read and summarize [written]), and III (Read and answer the questions) having four hours allocation to each. Further, in semester II two to three sessions on reading skills are usually conducted based on the needs of the students analysed by the course instructor in the class.

Both the CG and the EG were taught types of reading i.e. skimming, scanning, intensive, and extensive; reading techniques i.e. survey, question, read, recite, and review; and methods to improve speed of reading during theoretical discussion session. The course instructor has taught the reading units to the CG in traditional lecture mode and the exercises and tests are conducted on paper. The reading units and exercises of the EG has been conducted in active learning style classroom and tests were conducted in language laboratory setup.

A readability test helps in defining difficulty level of text content to read. Automated Readability, Coleman-Liau, Gunning Fog, LIX, and SMOG are some of the known formulae to calculate readability index. Agnihotri and Khanna (1991) have brought to front the limitations of these calculations. They claimed that readability is influenced not only by words and length of sentences but other factors as organisation of message, writer's understanding of its prospective readers, and reader's ability to access text outline also. Further, they concluded that readability of the content in a textbook varies most of the time. It leads researchers to select reading comprehension passages of technical and literary types for the pre-tests and the post-tests.

IV. ANALYSIS OF THE DATA

SPSS 14.0 statistical program is used for the data analysis and accepted a degree of significance $\alpha = 0.05$. One-way ANOVA, *F*-test were used to identify the effectiveness of computer aided teaching and assessment by processing the data received through the pre-test and post-test conducted for CG and EG.

Descriptive Statistics

Table 1 shows the score of CG and EG in pre-test. The mean score for pre-test shows the both groups have similar mean scores and there is no significant difference for selected skills.

TABLE 1 MEAN AND STANDARD DEVIATION (SD) FOR DIFFERENT READING SKILLS ASSESSED IN PRE-TEST

Subset of Reading Skills	Perception		Reasoning		Transcoding		Recalling	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Control	2.89	1.05	2.99	1.01	2.94	1.01	2.93	0.96
Experimental	2.94	1.15	3.09	1.15	3.05	1.11	3	1.06

Students' performance in the tests leads to state that they are homogeneous groups regarding the selected subset of reading skills.

The post-tests evaluated the same parameters as in the pre-tests. The following table shows the selected reading skill-wise post-test results of CG and EG.

TABLE 2 MEAN AND STANDARD DEVIATION (SD) FOR DIFFERENT READING SKILLS ASSESSED IN POST-TEST

Subset of Reading Skills	Perception		Reasoning		Transcoding		Recalling	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Control	3.49	1.02	3.38	0.92	3.44	0.94	3.54	0.97

Experimental	3.79	1.07	3.81	0.93	3.83	0.94	3.84	0.99
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The analysis in table 2 shows that the mean values of the selected subset of reading skills assessed in post-test are increased in comparison with mean values received in the pre-test. The graphical representation of the data in table 2 is shown in the Fig. 1.

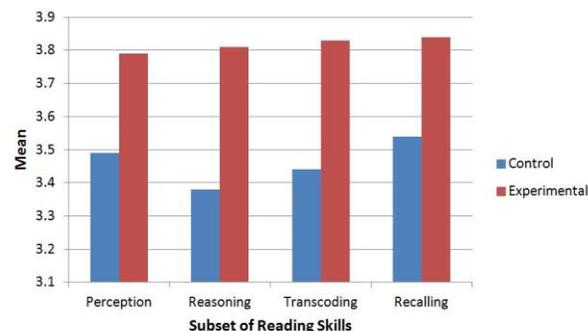


Fig. 1. Histogram showing comparison reading skills between CG and EG

Results based on One-way ANOVA

Comparison between performances of the groups in pre-test and post-test is performed using One-way ANOVA.

TABLE 3 ANOVA FOR DIFFERENT READING SKILLS ASSESSED IN PRE-TEST (CONTROL GROUP)

Source of Variation	SS	df	MS	F	P-value	Fcrit
Between Groups	0.5075	3	0.169167	0.166257	0.919092	2.62744077
Within Groups	402.93	396	1.0175			
Total	403.4375	399				

With respect to assessment of the selected reading skills ANOVA, $F(3, 396) = 0.166257$, $p > 0.05$ found insignificant difference in the pre-test between the groups.

TABLE 4 ANOVA FOR DIFFERENT READING SKILLS ASSESSED IN POST-TEST (CONTROL GROUP)

Source of Variation	SS	df	MS	F	p-value	Fcrit
Between Groups	1.40	3	0.46	0.50	0.667	2.62
Within Groups	366	396	0.92			
Total	367.43	399				

With regard to assessment of the selected reading skills, ANOVA, $F(3, 396) = 0.50$, $p > 0.05$ observed negligible difference in the post-test between the groups. Effect of the test is almost same.

TABLE 5 ANOVA FOR DIFFERENT READING SKILLS ASSESSED IN PRE-TEST (EXPERIMENTAL GROUP)

Source of Variation	SS	df	MS	F	p-value	F crit
Between Groups	1.26	3	0.42	0.33	0.800	2.62
Within Groups	496.58	396	1.25			
Total	497	399				

With reference to assessment of the selected reading skills, ANOVA, $F(1, 396) = 0.33$, $p > 0.05$ found inconsequential difference in the pre-test between the groups.

TABLE 6 SKILL-WISE ANOVA RESULTS OF POST-TEST FOR CONTROL VS. EXPERIMENTAL GROUPS

Subset of Reading Skills	Source of Variation	SS	df	MS	F	p-value	F crit
Perception	Between Groups	4.5	1	4.5	4.13	0.043	3.88
	Within Groups	215.58	198	1.088			
	Total	220.08	199				
Reasoning	Between Groups	9.245	19.245	10.83	0.001	3.88	
	Within Groups	168.95	198	0.853			
	Total	178.195	199				
Transcoding	Between Groups	7.605	17.605	8.62	0.004	3.88	
	Within Groups	174.75	198	0.882			
	Total	182.355	199				
Recalling	Between Groups	4.5	1	4.5	4.68	0.032	3.88
	Within Groups	190.28	198	0.96			
	Total	194.78	199				

In all the selected skill sets of the reading skill assessment the post-test has made a significant difference in favor of the EG, as revealed by ANOVA, F -column values for $F(1, 198)$, $p < 0.05$. The effect size is high.

TABLE 7 SKILL-WISE ANOVA RESULTS OF PRE AND POST-TEST FOR EXPERIMENTAL GROUP

Subset of Reading Skills	Source of Variation	SS	df	MS	F	p-value	F crit
Perception	Between Groups	36.12	1	36.12	29.28	1.79E-07	3.88
	Within Groups	244.23	198	1.23			
	Total	280.35	199				
Reasoning	Between Groups	25.92	1	25.92	23.80	2.19E-06	3.88
	Within Groups	215.58	198	1.088			
	Total	241.28	199				
Transcoding	Between Groups	30.42	1	30.42	28.56	2.48E-07	3.88
	Within Groups	210.86	198	1.064			
	Total	241.28	199				
Recalling	Between Groups	35.28	1	35.28	33.35	2.94E-08	3.88
	Within Groups	209.44	198	1.057			
	Total	244.72	199				

Regarding the measurement of subset of reading skills, ANOVA, F -column values for $F(1, 198)$, $p < 0.05$ found significant differences in post-test between the groups, also outdoing EG to CG.

The test statistics represented shows that the results are statistically significant i.e. there is positive effect of implementing computer-aids on EG over CG.

V. CONCLUSIONS

The improvement brought about by the use of computer-aided teaching of reading skills to EG is explained through enhancement in the skills of EG over CG, where traditional teaching method is used. The analysis discloses that in the post-test ANOVA $F(1, 198) = 4.682573$, $p < 0.05$ means EG shows improvement over the CG. The experiment undertaken confirms the improvement in selected subset of reading skills in EG. It supports the findings of researchers who insist on the importance of use of computer-aided teaching technique that helps to improve the performance in the reading comprehension exercises. Proficiency in reading helps students in their academic development. With computer-aided training in reading, trainee's comprehension abilities can be enhanced. This study proves to be a supporting work in stating that computer-aided teaching method has emerged as an effective tool in pedagogical practices in India. In the immediate future, it would be interesting to check whether the use of computer-aided teaching tools in rest of the reading skills not studied in the present work has a positive influence on the students.

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