Research Article

Multimedia mediated learning and learner-centered microteaching in developing pre-service teachers' teaching competencies and language proficiency

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ARTICLEINFO	ABSTRACT	

This experimental study determined the effect of multimedia-mediated learning and learner-centered microteaching on the language proficiency and teaching competencies of pre-service teachers. The pretest and posttest equivalent group design was used with 32 participants divided into two groups through the pairing of scores. The data were gathered using 46-item rubrics with seven subscales: subject matter, lesson planning, teaching process, classroom management, instructional materials, and communication skills and questioning skills. Data were analyzed using the mean, t-test for independent, and t-test for paired samples. Descriptive analysis showed that in the seven areas, the pre-service teachers have Satisfactory to Very Satisfactory performance in the pretest, but in the posttest, they improved to Outstanding. Statistical analysis showed that both the experimental (multimedia) and control (microteaching) groups' competencies and proficiency in the pretest were not significant. However, both the experimental and control group showed a significant increase in their performance in the post-test. The difference in the mean gain scores showed that even though both groups improved in the posttest, the teaching competencies and language proficiency of the pre-service teachers in the experimental group were much better than those of the control group. Both teaching methods are recommended for developing teaching competencies and language proficiency but using multimedia-mediated learning could result in better performance.

INTRODUCTION

The poor language proficiency of pre-service teachers as well as the preparedness of basic education teachers to appropriately integrate technology in teaching and learning have affected the quality of education in teacher education institutions in the Philippines. The performance of teachers in the recent licensure examination is one indication that more than 50% of pre-service teachers have not either mastered the theories and principles in teaching or their performance may have been affected by poor comprehension skills. Recently, there has been a growing concern among educational thinkers for reshaping Teacher Education programs; to make them more effective, meaningful, and scientific.

In the Teacher Education program, the courses are divided into two parts: theoretical and experiential or practice-teaching courses. But, nowadays, we find that there is no consensus regarding the procedures followed in various aspects of student-teaching and assessment of teacher behavior. The teacher-educators are not clear about the specific objectives of the training program. Supervision of practice teaching is haphazard and mostly unreliable. In many cases, pre-service teachers do not see the exact relationship between the content of the courses and actual teaching in the classroom. With the full implementation of the senior high school in the K to 12 Curriculum, there is a great demand for education graduates so, there is a need for Teacher Education Institutions to make their curriculum responsive to the needs of the time especially today, where there is a proliferation of information and communication technology tools that could be used in teaching.

Recent calls for educational reform in teacher education stress the need for innovative teacher education restructuring to ensure that pre-service teachers not only understand how to use a computer but also how to design high-quality technology-enhanced lessons (Dela Fuente & Biñas, 2020; Brush et al., 2003 Dawson, Pringle,& Adams, 2003 Ertmer, 2003). A preferred approach to restructuring teacher education courses with technology has been to infuse technology in method courses (Davis & Falba, 2002; Guy & Li, 2002) because method courses provide a meaningful context within which the integration of technology can be pedagogically situated in the teaching of subject matter. Thus, as Berondo and Dela Fuente (2021) and Ertmer (2003) states, that we need to become more specific and explicit about the types of technology-supported lessons that teacher educators design, and in particular, which technology is being infused or integrated to support learning.

It is the purpose of this research is to train pre-service teachers to effectively use technology for instruction. Thus, pre-service teachers will be able to effectively develop the competencies needed to teach with technology, develop good communication skills and improve the skills to impart what they have learned in school to their future students. This research used two strategies: the learner-centered microteaching application was used to provide students with practical experience after they have been exposed to different approaches and techniques for teaching. By conducting microteaching, students would try out the ideas they learned with their peers before using them in real classes. Another strategy introduced in this study was multimedia mediated learning which focused on the integration of technology in method courses based on the cognitive theory of multimedia learning popularized by the work of Richard E. Mayer and other cognitive researchers who argue that multimedia supports the way that the human brain learns. They assert that people learn more deeply from words and pictures than from words alone, which is referred to as the multimedia principle (Dela Fuente, 2021; Mayer, 2005a). Multimedia researchers suggest that multimedia learning occurs when we build mental representations from words and pictures (Mayer, 2005b). Becoming technology competent requires resources, time, and effort. Since this is already the age of technology, it is envisioned in this research that the pre-service teachers would use the technology to develop mastery of content at the same time develop confidence and improve communication skills that are needed in teaching.

Objectives

The study aimed to investigate the effect of multimedia mediated learning and learner-centered microteaching in improving the teaching competencies and language proficiency of pre-service teachers. Specifically, it answered the following questions:

1. What are the pre and post-test scores of the multimedia (experimental) group on teaching competencies in terms of subject matter, lesson planning, teaching process, classroom management, and instructional materials; and their language proficiency in terms of communication skills, and questioning skills?
2. What are the pre and post-test scores of the microteaching (control) group on teaching competencies in terms of subject matter, lesson planning, teaching process, classroom management, and instructional materials; and their language proficiency in terms of communication skills, and questioning skills?
3. Are there significant differences in the pretest scores of the multimedia (experimental) and microteaching (control) groups in the different subscales of teaching competencies and language proficiency?
4. Are there significant differences in the posttest scores of the multimedia (experimental) and microteaching (control) groups in the different subscales of teaching competencies and language proficiency?
5. Is there a significant difference in the mean gain scores of the multimedia (experimental) and microteaching (control) groups?

METHODS

The experimental method of research using the pretest and posttest equivalent group design was used in this study. The experimental group was composed of sixteen (16) pre-service teachers and another 16 were composed of the control group. The subjects were randomly assigned to the experimental and control groups through the pairing of scores based on the pre-test results. The actual intervention lasted for 20 days. The measurement tool used in this study was a researcher-made observation rubric based on the teaching behaviors in application and observation. The validated observation rubrics have 46 items under the following subscales: teaching competencies included subject matter (4), lesson planning (4), teaching process (10), classroom management (7), and instructional materials (6); while language proficiency included communication skills (6), and questioning skills (9). Assessment of pre-service teaching competencies and language proficiency was rated as: *4.21 – 5.00 Outstanding (O), 3.41 – 4.20 Very Satisfactory (VS), 2.61 - 3.40 Satisfactory (S), 1.81 – 2.60, Unsatisfactory (US),* and *1.00 – 1.80 Needs Improvement (NI).* The observation rubrics were used by five (5) evaluators during the pre and post-testing. The evaluators were composed of three peer evaluators, the teacher-researcher, and the self-evaluation of pre-service teacher. The same group of evaluators assessed the pre and post-testing.

Internvention

The study followed the learner-centered microteaching applications following these steps: decision-making, planning, application, evaluation, and reflection. The experimental group used multimedia mediated learning while the control group used learner-centered microteaching. As the name suggests, in the microteaching model, only 10 to 12 peers acted as students. Pre-service teachers decide on the topics for the lessons that they would teach. They wrote their lesson plans and prepared instructional materials. Pre-service teachers in the experimental group prepared their multimedia-based instructional materials based on a topic of their choice. Lessons were presented using PowerPoint or Prezi and were infused with a combination of the following: video clips, short films, public service announcements, advertisements, movie trailers, graphic organizers, etc. Student activities were answered using the computer. In the control group, pre-service teachers followed the steps for microteaching but they used traditional instructional materials like the flip chart, pictures, and flashcards. Students wrote their answers on the manila paper or chalkboard.

After each lesson presentation, a post-conference followed immediately. The peer evaluators discussed with the demo teacher the parts of the lesson that needed improvement and the demo teacher also assessed her performance based on the observation form. The evaluators discussed with the demo teacher her weaknesses and they gave suggestions on how to improve and reteach the lesson. A second teaching session was performed based on the suggestions of the evaluators. Pre-service teachers' teaching behaviors and language proficiency in the first teaching presentation using the observation rubrics were used as the data for the pretest and data from the observation rubrics for the second teaching presentation was the posttest.

RESULTS AND DISCUSSION

Teaching competencies and language proficiency of the multimedia group in the pretest and posttest

Teaching competencies and language proficiency of the multimedia group in the different subscales were all rated as very satisfactory in the pretest. In the posttest, subject matter, planning, classroom management, use of instructional materials, and communication skills were rated as Outstanding. Only the teaching process and questioning skills were rated as Very Satisfactory. This result implies that pre-service teachers have used the main principles and concepts in the subject area and they have demonstrated in-depth knowledge of the subject matter. Objectives of the lessons were presented clearly and activities in their lesson plans were arranged systematically. Instructional materials stimulated learners' curiosity and sustained learners' interest resulting in increased interaction as well as motivation. These instructional materials have also improved the assessment of learning. However, results also imply that pre-service teachers need more knowledge and practice in the use of recent strategies as well as in honing their questioning skills that do not only measure the lower level thinking skills but also the critical thinking of the students.

Table 1. Teaching competencies and language proficiency of the multimedia (experimental) group in the pre-test and posttest

Experimental Group Subscales	N	Pretest Mean	Pretest Description	Posttest Mean	Posttest Description
A. Teaching Competencies	16				
Subject Matter		3.66	Very Satisfactory	4.28	Outstanding
Lesson Planning	16	3.60	Very Satisfactory	4.26	Outstanding
Teaching Process	16	3.51	Very Satisfactory	4.12	Very Satisfactory
Classroom Management	16	3.61	Very Satisfactory	4.31	Outstanding
Instructional Materials	16	3.64	Very Satisfactory	4.43	Outstanding
B. Language Proficiency					
Communication skills	16	3.56	Very Satisfactory	4.29	Outstanding
Questioning Skills	16	3.68	Very Satisfactory	4.18	Very Satisfactory
Grand Mean		3.61	Very Satisfactory	4.27	Outstanding

Teaching competencies and language proficiency of the microteaching group in the pretest and posttest

Teaching competencies and language proficiency of the microteaching group were rated as Very Satisfactory in the pretest except for questioning skills which were rated as Satisfactory. In the post-test, all the subscales were again rated as Very Satisfactory. This implies that in using micro-teaching, pre-service teachers find opportunities to develop skills in drawing learners' attention, asking questions, using and managing time effectively, and bringing the lesson to a conclusion. Also, through microteaching, the teachers' class management skills improve. They acquire the skills to choose appropriate learner activities, use teaching goals, and overcome difficulties encountered

during the process. However, the use of traditional instructional materials has not considerably increased their motivation and interest in learning. Results also imply that proper training in questioning techniques could further develop their questioning skills.

Table 2. Teaching competencies and language proficiency of the microteaching (control) group in the pre-test and posttest

Microteaching Group Subscales	N	Pretest		Posttest	
		Mean	Description	Mean	Description
A. Teaching Competencies	16				
Subject Matter		3.48	Very Satisfactory	3.79	Very Satisfactory
Lesson Planning	16	3.64	Very Satisfactory	4.01	Very Satisfactory
Teaching Process	16	3.46	Very Satisfactory	3.83	Very Satisfactory
Classroom Management	16	3.69	Very Satisfactory	3.99	Very Satisfactory
Instructional Materials	16	3.42	Very Satisfactory	3.98	Very Satisfactory
B. Language Proficiency					
Communication skills	16	3.56	Very Satisfactory	3.84	Very Satisfactory
Questioning Skills	16	3.36	Satisfactory	3.70	Very Satisfactory
Grand Mean		3.52	Very Satisfactory	3.88	Very Satisfactory

Difference in the pre and posttest scores of the multimedia (experimental) group on teaching competencies and language proficiency

The difference in the pre and post-test scores of the experimental group showed that the computed value of 2.131 is lower than the tabular value of 8.784 which means that there is a significant difference in the teaching competencies and language proficiency of the experimental (multimedia) group since $p < .05$ level of significance. This result implies that the use of multimedia mediated learning as a teaching strategy was effective and has resulted in a significant improvement in the pre-service teachers' teaching competencies and language proficiency. According to Dela Fuente (2021) and Shyamlee and Phil (2012), multimedia technology can be used effectively in classrooms with proper computer knowledge on the part of teachers. This result also indicated that preparing pre-service teachers to become technology competent may be difficult but they should be provided with ample opportunities.

Table 3. Difference in the pre and post test scores of the multimedia (control) group on the different subscales of teaching competencies and language proficiency

Subscales	Critical t value	Computed t value	Decision	Interpretation
A. Teaching Competencies				
Subject Matter	2.13145	-9.56473	Reject Ho	Significant
Lesson Planning	2.13145	-5.51006	Reject Ho	Significant
Teaching Process	2.13145	-5.54323	Reject Ho	Significant
Classroom Management	2.13145	-9.295	Reject Ho	Significant
Instructional Materials	2.13145	-8.32843	Reject Ho	Significant
B. Language Proficiency				
Communication Skills	2.13145	-9.05087	Reject Ho	Significant
Questioning Skills	2.13145	-5.10908	Reject Ho	Significant
Teaching competencies And Language Proficiency	2.13145	-8.78414	Reject Ho	Significant

@ 0.05 level of significance

Difference in the pre and posttest scores of the microteaching (control) group on teaching competencies and language proficiency

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The difference in the pre and post-test scores as reflected in the critical t-value of 2.13 is lower than the t-value of 5.337 which means that there is a significant difference in the teaching competencies and language proficiency of the microteaching (control) group since p<.05 level of significance. This result implies that the use of the microteaching method was also effective and has resulted in a significant improvement in the pre-service teachers' teaching competencies and language proficiency in the different subscales. Using this model according to Desousky (2015) has resulted in better progress in the pre-service teacher's teaching behaviors as supported by Dela Fuente (2021). Results also indicate that microteaching is more effective than traditional or microteaching in improving communication skills.

Table 4. Difference in the pre and posttest scores of the microteaching (control) group on the different subscales of teaching competencies and language proficiency

Subscales	Critical Value	Computed Value	Decision	Interpretation
A. Teaching Competencies				
Subject Matter	2.13145	-3.20643	Reject Ho	Significant
Lesson Planning	2.13145	-3.92405	Reject Ho	Significant
Teaching Process	2.13145	-4.91221	Reject Ho	Significant
Classroom Management	2.13145	-3.30946	Reject Ho	Significant
Instructional Materials	2.13145	-7.475	Reject Ho	Significant
B. Language Proficiency				
Communication skills	2.13145	-3.22392	Reject Ho	Significant
Questioning Skills	2.13145	-4.94699	Reject Ho	Significant
Teaching Competencies and Language Proficiency	2.13145	-5.33754	Reject Ho	Significant

@ 0.05 level of significance

Difference in the pretest scores of the multimedia (experimental) and microteaching (control) group on teaching competencies and language proficiency

The critical t-value of 2.042 is greater than the computed t-value of 0.674 which means that there is no significant difference in the pretest scores of both groups since p>.05 level of significance. The result of the seven subscales also shows no significant difference as reflected in Table 5. This result implies that at the beginning of the study, both the experimental (multimedia) and control (microteaching) groups have almost the same or comparable levels of teaching competencies and language proficiency. This result validates the choice of the pretest and posttest equivalent group design for this study which is a true experimental design because it is assumed that the two groups are equivalent on all important dimensions and that there are no systematic differences between the two groups (Fraenkel & Wallen, 2009). In this experimental design, instead of randomization, subjects in the two groups are matched on a list of characteristics that might affect the outcome of the research which in this case are their teaching competencies and language proficiency.

Table 5. Difference in the pretest scores of the multimedia (experimental) and microteaching (control) groups on the different subscales of teaching competencies and language proficiency

Subscales	Critical t value	Computed t value	Decision	Interpretation
A. Teaching Competencies				
Subject Matter	2.042272	1.54355	Failed to reject Ho	Not Significant
Lesson Planning	2.042272	-0.24962	Failed to reject Ho	Not Significant
Teaching Process	2.042272	0.302056	Failed to reject	Not Significant

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Classroom Management	2.042272	-0.5995	Failed to reject Ho	Not Significant
Instructional Materials	2.042272	1.555655	Failed to reject Ho	Not Significant
B. Language Proficiency Communication Skills	2.042272	0.014325	Failed to reject Ho	Not Significant
Questioning Skills	2.042272	1.964946	Failed to reject Ho	Not Significant
Teaching Competencies and Language Proficiency	2.042272	0.674355	Failed to reject Ho	Not Significant

@ 0.05 level of significance

Difference in the posttest scores of the multimedia (experimental) and microteaching (control) groups on teaching competencies and language proficiency

The effect of the two interventions at the end of the study shows that the t-value of 2.042 is lower than the computed t-value of 3.660 which means that there is a significant difference in the post-test scores of both groups since $p < .05$ level of significance. Among the seven subscales, only the area of lesson planning was not significant. This shows that the pre-service teachers have improved in their knowledge of the content or subject matter of their lessons as well as in their teaching and communication skills. This result further implies that multimedia mediated learning is a better teaching strategy than microteaching. The result of this investigation supports previous research that technology-enhanced multimedia instruction increases student motivation (Dela Fuente, 2019; Boehm, 2009; Torff & Tirotta, 2010), develops curiosity, and makes learning experiences memorable (Allen, 2003). The use of multimedia in teaching is effective in nurturing students' interest in learning English as well as enhancing teachers' interest in teaching (Shyamlee & Phil, 2012).

Table 6. Difference in the post-test scores of the multimedia and microteaching groups on the different subscales of teaching competencies and language proficiency

Subscales	Critical Value	Computed Value	Decision	Interpretation
A. Teaching Competencies				
Subject Matter	2.042272	4.265318	Reject Ho	Significant
Lesson Planning	2.042272	1.968192	Failed to reject Ho	Not significant
Teaching Process	2.042272	2.729481	Reject Ho	Significant
Classroom Management	2.042272	2.770274	Reject Ho	Significant
Instructional Materials	2.042272	3.922244	Reject Ho	Significant
B. Language Proficiency				
Communication Skills	2.042272	3.267719	Reject Ho	Significant
Questioning Skills	2.042272	4.665854	Reject Ho	Significant
Teaching Competencies and Language Proficiency	2.042272	3.66029	Reject Ho	Significant

@ 0.05 level of significance

Difference in the mean gain scores

In order to determine whether the result was caused by the intervention, the mean gain scores were computed. The difference in the mean gain scores showed a significant difference in the performance of both groups. The result shows that the increase in the teaching competencies and language proficiency of the multimedia group was due to the intervention and multimedia mediated

learning was a better teaching strategy than just microteaching. Through the use of multimedia, we can offer students not only rich sources of authentic learning materials but also an attractive interface, vivid pictures, and pleasant sound and overcome a lack of an authentic language environment. It is in the hands of teachers to decide how to use and design pedagogically sound technology-enhanced multimedia instruction since they are in charge of making instructional decisions in the classroom. Research has documented that teachers' readiness to use technology in the classroom (Dela Fuente, 2021; Hubbard, 2008; Hubbard & Levy, 2006b) and students' readiness to use technology (Stockwell & Levy, 2001) are some of the favorable conditions for the successful integration of technology-enhanced multimedia instruction in the classrooms.

Table 7. Difference in the mean gain scores of the multimedia (experimental) and microteaching(control) groups

Group	Mean	Mean Diff	T-value	Sig. Value
Experimental	.6576			
		.2958	6.178	.000
Control	.3618			

CONCLUSION AND RECOMMENDATION

Based on the findings, the following conclusions are drawn: The multimedia group's level of teaching competencies and language proficiency improved to Outstanding in the post-test while the microteaching group was Very Satisfactory. Both the multimedia and microteaching groups' level of teaching competencies and language proficiency improved in the posttest. Multimedia mediated learning has resulted in higher levels of teaching competencies and language proficiency as compared to microteaching.

The researcher recommends that the faculty members of the College of Education could use either multimedia mediated learning or microteaching as teaching strategies to develop the teaching competencies and language proficiency of the pre-service students. Faculty members teaching professional education courses should revise their curriculum and syllabi to include more learner-centered activities and maximize the use of multimedia mediated learning in their lessons. The pre-service teachers should continue their training in the use of multimedia technology inside the classroom and bring this technique to their cooperating schools during practice teaching. They should also improve their language proficiency by improving their communication and questioning skills. The administrators and principals of cooperating schools should encourage their teachers to observe and learn how multimedia mediated learning should be conducted as well as the use of learner-centered activities. In-service training should be conducted for teachers on the use of multimedia technology because this can improve motivation, heighten the interest of the learners and improve the assessment of learning. The curriculum makers of the K to 12 curricula should see to it that teachers teaching the different subjects should infuse their instruction with technology-based teaching materials. Teacher Education Institutions should implement an action plan to ensure improvement in the teaching competencies and language proficiency of the pre-service teachers.

REFERENCES

Abbott, S (2014). Hidden curriculum. The glossary of education reform.

Angeli, C. (2005). Transforming a teacher education course through technology: Effect on pre-service teachers technology competency. *Computers and Education*, 45, 383-398. doi:10.1016/j.compedu.2004.06.002

Berondo, R.G. & Dela Fuente, J.A. (2021). Technology Exposure: Its Relationship to the Study Habits and Academic Performance of Students. *Utamax : Journal of Ultimate Research and Trends in Education*, 3(3), 125-141. https://doi.org/10.31849/utamax.v3i3.7280

Brush, T., Glazewski, K., Rutowski, K., Berg, K., Stromfors, C., Van-Nest, M.H., Stock, L., & Sutton, J. (2003). Integrating technology in a field-based teacher training program: the PT3@ASU Project. *Educational Technology Research and Development*, 51(1), 57–72.

Chandler, P. & Sweller, J. (1991). Cognitive load theory and the format of instruction. *Cognition and Instruction*, 8(4), 293-332.

Davis, K.S. & Falba, C.J. (2002). Integrating technology in elementary preservice teacher education: orchestrating scientific inquiry in meaningful ways. *Journal of Science Teacher Education*, 13(4), 303–329

Dawson, K., Pringle, R., & Adams, T. L. (2003). Providing links between technology integration, methods courses, and school-based field experiences: a curriculum-based and technology-enhanced microteaching. Journal of Computing in Teacher Education, 20(1), 41–47.

Dela Fuente, J.A. (2021). Contributing factors to the performance of pre-service physical science teachers in the Licensure Examination for Teachers (LET) in the Philippines. *Journal of Educational Research in Developing Areas*, 2(2), 141-152. https://doi.org/10.47434/JEREDA.2.2.2021.141

Dela Fuente, J.A. & Biñas, L.C. (2020). Teachers' competence in information and communications technology (ICT) as an educational tool in teaching: An empirical analysis for program intervention. *Journal of Research in Education, Science and Technology*, 5(2), 61-76.

Dela Fuente, J.A. (2019). Driving Forces of Students' Choice in specializing science: a science education context in the Philippines Perspective. *The Normal Lights*, 13(2), 225-250.

Dela Fuente, J.A. (2021). Facebook messenger as an educational platform to scaffold deaf students' conceptual understanding in environmental science subject: A single group quasi-experimental study. *International Journal of Education*, 14(1), 19-29. doi:10.17509/ije.v14i1.31386

Dela Fuente, J.A. (2021). Implementing inclusive education in the Philippines. College teacher experiences with deaf students. *Issues in Educational Research*, 31(1), 94-110. http://www.iier.org.au/iier31/dela-fuente.pdf

Ertmer, P. (2003). Transforming teacher education: visions and strategies. *Educational Technology Research and Development*, 51(1), 124–128. DOI: 10.1007/BF02504522

Fraenkel, J.R. & Wallen, N.E. (2009). How to Design and Evaluate Research in Education - Seventh Edition. New York, USA: McGraw - Hill Companies, Inc.

Good, C.V. (1973). Dictionary of Education Third Edition. New York: McGraw-Hill Book Company.

Ketsman, O. (2012). Technology-enhanced multimedia instruction in foreign language classrooms: A mixed methods study. *Educational Administration: Theses, Dissertations, and Student Research.*

Mayer, R.E. (2005). Cognitive theory of multimedia learning. In R.E. Mayer (Ed.). *The Cambridge Handbook of Multimedia Learning*. New York: Cambridge University Press. DOI:http://dx.doi.org/10.1017/CBO9780511816819.004

Mayer, R.E. (2005). Introduction to multimedia learning. In R.E. Mayer (Ed.). *The Cambridge Handbook of Multimedia Learning*. New York: Cambridge University Press.

National Center for Education Statistics (2000). Teacher use of computers and the internet in public schools. Institute of Education Sciences. U.S. Department of Education.

Peck, K.L., Augustine, C., & Popp, D. (2003). The AECT Project: Modeling the effective use of technology in teacher education. *TechTrends*, 47(2), 21–23

Pringle, R.M., Dawson, K., & T. Adams, T. (2003). Technology, science and pre-service teachers: Creating a culture of technology-savvy elementary teachers. *Action in Teacher Education* 24 (4): 46-52.

Schnotz, W. (2008). Why multimedia learning is not always helpful. In J.F. Rouet, R. Lowe & W. Schnotz (Eds.), *Understanding multimedia documents* (pp.17-41). New York: Springer.

Selinger, M. (2001). Learning information and communications technology skills and the subject context of the learning. *Journal of Information Technology for Teacher Education*, 10(1 & 2), 143–154.

Shyamlee, S.D. & Phil, M. (2012). Use of technology in English Language Teaching and Learning":
An Analysis. *2012 International Conference on Language, Medias and Culture IPEDR Vol.
33 IACSIT Press, Singapore.*

Sorden, S.D. (2005). A cognitive approach to instructional design for multimedia learning.
Information Science Journal, 8, 263-279.