

Effect Of E-Content In Learning Social Science At Pre-Service Teachers

P.Sasikala^{1*}, M.Vakkil²

^{1*}Research Scholar, Department Of Education, Periyar University, Salem, Tamil Nadu, E-Mail-sasi2020kala@gmail.com, orcid id: 0000-0001-5789-1199, ¹Corresponding Author.

²Research Supervisor, Associate Professor, Department of Education, Periyar University, Salem, TamilNadu, India. orcid id: 0000-0003-3385-1031

Citation: P.Sasikala,Et.al (2024), Effect Of E-Content In Learning Social Science At Pre-Service Teachers, *Educational Administration: Theory and Practice*, 30(2), 1303-1310 Doi: 10.53555/kuey.v30i2.6640

ARTICLE INFO

ABSTRACT

The world is changing towards a knowledge-based economy. Education is an area where technologies are helping in overcoming many barriers like time and distance to make it universally available and in teacher education; the ultimate objective of using the technologies is extending the boundaries of knowledge and uplifting the learning process. Teachers are the agent of change. Using computers in classrooms in a constructive manner is a teacher's decision. Teachers must have opportunities to work with technology, models of how computers work with instructions, and also the opportunities to reflect on their technologies role in the learning process.

Keywords: Effect, e-content, Learning social science, B.Ed Level.,

STATEMENT OF THE PROBLEM

Considering the reviews, research questions, and rationale it is felt by the researcher that e-content which has been extensively experimented with, systematically studied, and rigorously enquired about all over the globe needs to be studied in India about academic achievement.

Hence, nowadays, technology is the most needed in classrooms. Today teachers will need to prepare tomorrow's classrooms. Hence there is a need to check the e-Content or multimedia or virtual learning materials were needed to investigate it. To respond above research questions and issues, the present piece of research was selected and stated as: "Effect of E-Content in Learning Social science at pre-service teachers"

The teaching profession has a great responsibility in social development. Student teachers of today are going to be teachers either in schools or colleges/ universities in the future. So it is necessary to find out their technical knowledge for student teachers in this present study The present study of the Problem is, "Effect of e-Content in learning Social science at pre-service teachers".

SCOPE AND LIMITATIONS OF THE STUDY

This is an experimental study. The study was intended to prove experimentally whether the e-content technique is effective in developing academic achievement. Researcher experiment conducted on B.Ed college student teachers. Since the college is a co-educational institution, the study included both boys and girls. social science subject is chosen as the subject to be taught and learned through the e-content technique. The effect of e-content compared with the conventional method of learning social science to know which method works well.

OBJECTIVES

The objectives formulated the study are;

- To study the effect of e-content on achievement tests in social science.
- To study the impact of e-content on the achievement of males and females.
- To Prepare and evaluate an e-Content package for learning social science at Bachelor of education Level.
- To study the effectiveness of the e-Content package on learning social science at the B.Ed level concerning their demographic variables.

HYPOTHESIS

The hypotheses formulated the study are;

- There is a significant difference between learning social science at the B.Ed level concerning demographic variables.
- There is a significant difference in the pre and post-test scores of control and experimental group learning on Social science at the B.Ed level.
- There is a significant difference between learning social science at the B.Ed level related to their achievement through the e-Content method.
- There is a significant difference in the gain score on e-Content learning on Social science at the B.Ed level.

RESEARCH DESIGN FOR THE STUDY

Nature of study : Experimental Method

Type of variables :i) Independent

e-Content Package

ii)Dependent

Academic Achievement

iii)Demographic Variables

Gender

Location of college

Type of college

Utility internet in Home

Population : B.Ed student teachers at Namakkal Dt.

Sample : (Govt, Private) 60 samples B.Ed student teachers at Namakkal

Sampling Techniques : Systematic Random Sampling Method

Statistical Techniques : Descriptive Mean SD

Inferential Correlation

't' & F- test

VARIABLES OF THE STUDY

Variable is any factor, trait, or condition that can exist in different types.

E-Content Package is independent variable and academic achievement is Dependent variable.

DEPENDENT VARIABLE

Academic Achievement

A dependent variable is what is measured in the experiment and what is affected during the experiment. In the present study, the following were considered as the dependent variable as academic achievement.

Demographic Variables

Demographic variables are Gender, Location of college, Type of college and computer utility in home

METHODOLOGY OF THE STUDY

This research involves the Experimental method. A social science subject representation program using e-Content on the dependent variable academic achievement. A comparison was made between the experimental group who studied using a Social science subject presentation program which uses e-Content along with a teacher educator and the other group is a control one who studied using the traditional method of discussion and dialogue along with a teacher educator. The variables were controlled which means that both groups are equivalent in terms of specialty, academic level, teacher, and teaching location, and the two groups have undergone pre and post-academic achievement tests.

PRELIMINARY DRAFT OF THE TOOL

The investigator thoroughly referred to different Educational Technology books and articles and discussed them with different experts in Educational Technology and concern Guide and then framed two different types of tools.

In Achievement Test on Social science subject scale consists of 60 concepts. The Preliminary draft is used at the beginning or initial stage of the study. It has nothing but a preliminary sketch of a design (or) picture of the whole tool.

CONSTRUCTION OF TOOLS

The tools in the study are as follows;

1. Achievement Test on Social science – Two Point Scale.

In final Achievement Test consists of 40 items out of 60 items which means the 20 remaining items arenorelevant to the concerned idea of the subjects.

PILOT STUDY

The investigator selected a participatory, pilot study that involved 20 teacher educators who were handling different types of B.Ed., colleges (Government and Private) and asked their opinion of achievement test. According to their recommendations, suggestions, and their need, the investigator changed the tool and finalized the tool.

VALIDITY OF THE TOOL

Validity is the extent to which a test measures what it is perfect to measure. Several kinds of validity are as certain they are content validity, Face validity, and intrinsic validity. Validity of the research tool or procedure that measured what it purports to measure. Validity is the quality of a data-gathering instrument or procedure that enables it to measure what it is supposed to measure. The index of reliability is sometimes taken as a measure of validity. For ascertaining the validity, the investigator used content validity, face validity, and intrinsic validity.

RELIABILITY OF THE TOOL

Here the reliability value of the Tool scale (achievement test) consists of 0.72.

SAMPLES FOR THE STUDY

The purpose of the present investigation was for B.Ed level student teachers from two colleges- a Government and a private college. The sample size is 60, having thirty students from each College. In total sixty student teachers were selected from the two colleges through systematic random sampling methods. The students were selected, based on their performance in the internal Examination. Experimental and Control groups were formed with 15 students each. These two groups were equated using their internal Examination. The investigators engaged the control group using the traditional method of learning. The stratified proportionate random sampling technique was adopted and the total number of samples is 60.

SAMPLE FOR THE STUDY

Type of college	Strength of Sample		Total Sample Population
	Control	Experimental	
Government	15	15	30
Private	15	15	30
Total Samples	30	30	60

METHODOLOGY

As per the rationale of the study, there was a need to know the effect of e-content on the learning social science of student teachers. So it is experimental research that was found fit to the purpose. There are various designs of an experimental study those answer about the future perspective of a matter.

In a midst of pre-experimental, quasi-experimental, and true-experimental designs, the last type proved to be the most appropriate design to produce scientifically generalizable results (Koul, 1993). Taking all these things into consideration the study followed the parallel group experimental design. The researcher selected a strong experimental design. i.e., randomized matched groups Pre-test Post-test.

DEVELOPMENT OF SCENARIO FOR E-CONTENT PACKAGE

The researcher prepared the scenario for the e-content development package. The scenario was drafted not missing even a single learning point for the study of unit 'Lesson Plan, Unit Plan, Micro Teaching, Teaching Methods, Bloom's taxonomy, Herbart steps, Types of test'. Based on the scenario, the researcher designed the e-Content package for the social science. The designed scenario was given to subject experts to check the accuracy of the scenario.

The following steps is used to design the e-content.

- Subject knowledge: met experts, Gathered all social science subject materials, researcher went to library, read the reviews were done. A subject materials was collected widely.
- Researcher arranged the sentence packets as sequence order and ending with appropriate conclusions.
- Researcher rewriting and necessary finishing was done to give the final content of social science subject.
- Researcher develops the full-length social science subject scripts with a complete list of visual illustrations and accompanying, voice, and music.

Table H.1 Mean, S.D and 't' value of Control and Experimental Group Pre-test in Social science

Test	Group	N	Mean	S.D	't' - value
Pre Tests	Control	30	36.34	1.76	0.232901 @
	Experimental	30	36.44	2.28	

(@ = No significant at 0.05 level)

From the above table it is noted that the calculated 't' value is 0.233 at 0.05 level indicates no significance. Hence the hypothesis formulated in this context viz., 'There is a significant difference in the mean achievement score (pre-test) of the students with respect to Conventional instruction and e-Content learning in the subject of Social science' is rejected. This indicates that both groups are equal in pre-test scores in Social science.

Table H.2 Mean, S.D and 't' values of Control and Experimental Group Post-test in Social science

Test	Group	N	Mean	S.D	't' - value
Post Tests	Control	30	36.92	1.82	4.076389 *
	Experimental	30	38.98	2.86	

(* = Significant at 0.05 level)

From the above table it is noted that the calculated 't' value is 4.076 at 0.05 level indicates significance. Hence the hypothesis formulated in this context viz., 'There is a significant difference in the mean achievement score (post-test) of the students with respect to Conventional instruction and e-Content instruction in the subject of Social science' is accepted. This indicates that both groups are not equal in post-test scores in Social science. Further, the mean score shows that post test students mean scores of Control group are better than the Experimental group student mean scores towards the social science learning. Here, both the group of Control and Experimental achievement score were differ indicted that the effect of e-Content Instruction. Due to the e-Content Instruction, the experimental mean score was higher than the control group mean score.

TABLE H.3 Mean, S.D and 't' value of Control Group Pre & Post tests in e-Content Instruction of Social science

Group	Tests	N	Mean	S.D	't' - value
Control	Pre Test	30	36.34	1.76	1.536757 @
	Post Test	30	36.92	1.82	

(@ = No significant at 0.05 level)

There is a significant difference between pre test and post test phase in Control group students on Social science ('t' value=1.537) at 0.05 level. Hence pre and post test students are not equal in learning of Social science as shown in the (table H.3). Further, the mean score shows that post test students mean scores are better than the pre test student mean scores towards the e-Content learning of Control group students. Hence the hypothesis formulated in this context viz., 'There is a significant difference in the mean achievement score of pre and post-test phases of Control group in the subject of Social science', is accepted. That means both the group of in Control group the achievement score of pre and post tests are not same in this sample for Social science. They were entirely differing in learning social science.

TABLE H.4 Mean and S.D, 't' value of Experimental Group Pre & Post tests in e-Content Instruction in Social science

Group	Tests	N	Mean	S.D	't' - value
Experimental	Pre Test	30	36.44	2.28	4.658482 *
	Post Test	30	38.98	2.86	

(* = Significant at 0.05 level)

There is a significant difference between pre test and post test phase in Experimental group students on Social science ('t' value=4.658) at 0.05 level. Hence pre and post test students are not equal in learning social science as shown in the (table H.4). Further, the mean score shows that post test students mean scores are better than the pre test student mean scores towards the e-Content learning of Experimental group students.

Hence the hypothesis formulated in this context viz., 'There is a significant difference in the mean achievement score of pre and post-test phases of Experimental group in the subject of Social science', is accepted. That means both the group of boys and girls in Experimental group the achievement score of pre and post tests are

not same in this sample for Social science. They were entirely differing in learning social science. This indicates that the Social science is more effective in experimental group then the control group.

TABLE H.5 Mean, S.D and 't' value of Control Group of Post tests in e-Content Instruction in Social science (Gender wise)

Test	Group	N	Mean	S.D	't' - value
Control	Boys	30	36.26	1.78	0.416903 @
	Girls	30	36.42	1.86	

(@ = No significant at 0.05 level)

From the above table-H.5, it is noted that the calculated 't' value is 0.417 at 0.05 level indicates no significance. Hence the hypothesis formulated in this context viz., 'There is a significant difference in the mean achievement score (post-test) of the boys and girls students with respect to Control group in the subject of Social science' is rejected. This indicates that both the Control boys and girls groups are equal in post-test scores in Social science.

TABLE H.6 Mean, S.D and 't' value of Experimental Group of Post tests in e-Content Instruction in Social science (Gender wise)

Test	Group	N	Mean	S.D	't' - value
Experimental	Boys	30	36.76	2.18	0.421487 @
	Girls	30	36.98	2.74	

(@ = No significant at 0.05 level)

From the above table-H.6, it is noted that the calculated 't' value is 0.421 at 0.05 level indicates no significance. Hence the hypothesis formulated in this context viz., 'There is a significant difference in the mean achievement score (post-test) of the boys and girls students with respect to Experimental group in the subject of Social science' is rejected. This indicates that both the Experimental boys and girls groups are equal in post-test scores in Social science.

TABLE H.7 Mean, S.D and 't' value of Urban and Rural group for e-Content Instruction in Social science

Test	Group	N	Mean	S.D	't' - value
Locality of college	Urban	30	36.54	2.32	4.872011 *
	Rural	30	38.26	2.94	

(* = Significant at 0.05 level)

There is a significant difference between Urban and rural group students on learning of Social science through e-content is ('t' value= H.7) at 0.05 level. Hence the Urban and rural group students are not equal in learning of Social science as shown in the (table H.7). Further, the mean score shows that rural group mean scores are better than the urban group student mean scores towards the e-Content learning. Hence the hypothesis formulated in this context viz., 'There is a significant difference in the urban and rural group students on learning of Social science through e-content', is accepted. That means both the group of rural and urban are same in this sample for Social science learning thorough e-content. They were entirely differing in learning social science. This indicates that the e-Content Instruction is more effective particularly in Social science.

TABLE H.8 Mean, S.D and 't' value of Computer network Utility or non- utility Group for e-Content Instruction in Social science

Test	Group	N	Mean	S.D	't' - value
Computer network utility	Yes	30	36.48	2.16	4.347881 *
	No	30	38.86	2.98	

(* = Significant at 0.05 level)

There is a significant difference between Computer network utility or non-utility group tests students on Social science ('t' value= 4.35 at 0.05 level. Hence the Computer network utility or non-utility group students are not equal in learning of Social science as shown in the (table H.8). Further, the mean score shows that Computer network utility group mean scores are better than the non- utility group student mean scores towards the e-Content learning. Hence the hypothesis formulated in this context viz., 'There is a significant difference in the Computer network utility not groups in the subject of Social science', is accepted. That means

both the group of Computer network utility and non-utility are different as per this sample for Social science learning through e-content. They were entirely differing in learning social science. This indicates that the e-Content Instruction is more effective particularly in Social science.

TABLE H.9 Mean and S.D 'f value of Control and Experimental Group in Type of college for e-Content Instruction

Types of Schools	Mean value	Degrees of freedom	F value
Between group	33.856	02	18.24
Within group	112.60	42	2.626
Total	146.456	44	8.326

An F-test is any statistical test in which the test statistic has an F-distribution under the null hypothesis. It is most often used when comparing statistical models that have been fitted to a data set, in order to identify the model that best fits the population from which the data were sampled. Exact "F-tests" mainly arise when the models have been fitted to the data using least squares. The critical ratio of df is 2.82. The calculated value of table is 8.33. The critical value is much larger than this calculated value. So the investigator concludes that there is a significant difference between the means.

MAJOR RESULTS OF THE STUDY

- The researcher concluded that the H-1(H-Hypothesis), there would be a significant difference in the mean score of achievement test (pre-test) of the student teachers concerning Conventional instruction and e-Content learning in the subject of Social science' is accepted ('t' value =0.233). This indicates that both groups are equal in pre-test scores in Social science.
- H-2 of there would be a significant difference in the mean score of achievement(post-test) of the student teachers concerning Conventional instruction and e-Content learning in the subject of Social science learning' is rejected ('t' value =4.076). This indicates that experimental & control groups are not equal in post-test scores in Social science.
- H-3 of there would be a significant difference in the mean achievement score of both test phases of the Control group in the subject of learning social science', is accepted. ('t' value =1.357). That means both the group boys and girls in the Control group the achievement score for pre and post-tests are not the same; but more or less different in this sample for e-Content Instruction.
- H-4 is; 'There would be a significant difference in the mean achievement score of both test phases of Experimental group in the subject of learning social science is accepted. ('t' value= 4.658). That means both the group of boys and girls in the Experimental group the achievement scores of pre and post-tests of e-Content learning. They were entirely different in learning social science. Experimental group is more effective than the control group.
- H-5 of there would be a significant difference in the mean achievement score (post-test) of the boys and girls students concerning the Control group in the subject of e-Content learning' is accepted. ('t' value is 0.417). This indicates that both the Control male and female groups are equal in post-test scores in e-Content learning.
- H-6 of there would be a significant difference in the mean achievement score (post-test) of the boys and girls students concerning the Experimental group in the subject of e-Content learning is accepted. ('t' value is 0.421). This indicates that both the Experimental boys and girls groups are equal in post-test scores in e-Content learning.
- H-7 of there would be a significant difference between the urban and rural groups in the subject of Social science learning through the e-content method of teaching', is rejected. ('t' value is 4.956). That means both the group of urban and rural the gain scores were not the same in this sample for e-Content learning. They were entirely different in learning social science. This indicates that Multimedia learning is more effective, particularly in e-Content learning.
- H-8 of there would be a significant difference between the computer network utility and non-utility group in learning social science through the e-content method', is rejected. ('t' value is 4.356). That means both the group of computer network utility and non-utility groups the mean scores were not the same in this sample for e-Content learning. They were entirely different in learning social science. This indicates that Multimedia learning is more effective, particularly in e-Content learning.
- H-9 is of the critical ratio of (2.82). The calculated value is (8.326). The critical value is much larger than this, calculated value. So researcher concludes that there would be a significant difference between the computer internet utility in the home-group and the non-utility in-home group on the subject of Social science learning through the e-content method.
- With so much e-content available, the teacher's role is changing to act more like a guide. Technology develops more opportunities for learners. The teacher's role is more important than ever. whereas technology and great teachers can help learner achieve their full potential.
- Technology is going to have a significant effect on social science subject learning.

RECOMMENDATIONS:

No doubt e-content technique has been proven in many countries as an effective and efficient technique in learning. The present study has technology fields that can be carried out.

- The effect of e-content can be studied on a single subject.
- The e-content can be tried out at different stages of education starting from primary to higher education.
- E-content may be replicated in different types of education such as Arts, Science, general, medicine education, and professional education.
- The e-content may be conducted in slum and tribal areas.
- Comparative studies may be undertaken about e-content learning and traditional learning.
- The E-content technique can be used for the development of learning of children with special needs, disabled children, physically challenged, learning disabled, slow learners, etc.
- The effect of the e-content learning technique may be compared to the performances of urban and rural students.
- A comparative study may be undertaken about government and private schools.
- The effect of e-content may be compared to the performance of English medium and Tamil medium schools.

EDUCATIONAL IMPLICATIONS OF THE RESEARCH

The educational implications of the study are as follows;

- The e-content learning technique can be successfully be materialized at all B.Ed colleges in an urban area for the development of achievement
- The subject of Social science has not been considered an important subject of study and for most student teachers, it is a difficult subject. Therefore, e-content of learning in social science should be widely used in private colleges in Namakkal district in Tamilnadu
- The e-content technique can be effectively used by different subjects for the study of different college subjects.
- Teacher training institutions, SCERT and NCERT should take initiative in the development of e-content packages for student teachers, so that they may be able to transact the curriculum effectively.
- Student teachers should be trained relating to the development of e-content packages.
- A positive attitude is a key factor for success in any field of action which is a paramount factor in the e-content learning frame. So despite the failure of student teachers, they should be encouraged positively and at every time student teachers should have a motivating and encouraging attitude and interest to develop a positive optimistic mental set among learners.
- Teachers should be involved in feedback reviews for activities of the learning session. Which will rectify the student's faults and clarify their doubts and ultimately lead to their optimum learning.

CONCLUSION

Here the researcher would like to add one final comment that a student-teacher cannot be a substitute for technology and hence student teachers must not compromise their positive role in the classroom while using technological aids in the learning process. An advantage of having e-content techniques can be considered as milestones in the field of learning and also offer new possibilities in education. These inventions have opened new frontiers and possibilities in the field of education and made the teaching and learning process faster and more effective via technological tools. The researcher may conclude that e-content is an important role that has the possible to make the learning of social science subject. Technology is a promising tool to make all subjects learning process more interesting and effective. Researcher strongly believes if we use this technology as a part of our learning process then it would surely fill the gap between student and teacher. This experimental study is concluded the effect of e-content learning in social science at the B.Ed level is more and this method is effective for their social science development in classroom situations.

References:

1. Albina, A. P. (2018). Effectiveness of E-content in teaching of mathematics education among B. Ed. Student-teachers. *American Journal of Educational Research*, 6(7), 1021-1028, <https://pubs.sciepub.com/education/6/7/20/index.html>.
2. Arya, P., Christ, T., & Wu, W. (2020). Patterns of Technological Pedagogical and Content Knowledge in Preservice-Teachers' Literacy Lesson Planning. *Journal of Education and Learning*, 9(5), 1-14, <https://files.eric.ed.gov/fulltext/EJ1270579.pdf>.
3. Bhattacharjee, B., & Deb, K. (2016). Role of ICT in 21st century's teacher education. *International Journal of Education and Information Studies*, 6(1), 1-6, https://www.ripublication.com/ijeis16/ijeisv6n1_01.pdf.
4. Bhowmik, S., & Bhattacharya, M. D. (2021). Factors influencing online learning in higher education in the emergency shifts of COVID 19. *The Online Journal of Distance Education and e-Learning*, 9(1), 74-83, <https://tojdel.net/journals/tojdel/articles/v09i01/v09i01-08.pdf>.

5. Gupta, M., & Lata, P. (2017). Effectiveness of IT-enabled Instructional package (ITEIP) on science achievement of X class students in relation to their gender. *British Journal of Multidisciplinary and Advanced Studies*, 1(1), 30-44, <https://bjmas.org/index.php/bjmas/article/view/6>.
6. Hamid, S. N. M., Lee, T. T., Taha, H., Rahim, N. A., & Sharif, A. M. (2021). E-content module for Chemistry Massive Open Online Course (MOOC): Development and students' perceptions. *JOTSE: Journal of Technology and Science Education*, 11(1), 67-92, <https://files.eric.ed.gov/fulltext/EJ1303139.pdf>.
7. Hanson, R. (2020). Designing E-Content for Teaching Basic Analytical Chemistry in Higher Education: A Baseline Study. *Science Education International*, 31(1), 22-28, <https://files.eric.ed.gov/fulltext/EJ1247845.pdf>.
8. Jain, R., & Singh, A. K. (2020). Technological Approaches for E-Content Development and Deployment: A Qualitative Analysis From Experts' Perspective. *International Journal of Information and Communication Technology Education (IJICTE)*, 16(3), 92-112 <http://dx.doi.org/10.4018/IJICTE.2020070107>.
9. Jena, A. K., & Devi, J. (2020). Lockdown Area of COVID-19: How Does Cartoon Based E-Contents Effect on Learning Performance of Indian Elementary School Students with ADHD. *Online Submission*, 8(4), 189-201, <https://files.eric.ed.gov/fulltext/ED608666.pdf>.
10. Kalaiyarasan, G. (2015). Effectiveness of Active Learning Method in Teaching of Social Science at Upper Primary Level. *Shikshanaveshika*, 5(1), 23-26, <http://dx.doi.org/10.5958/2348-7534.2015.00005.7>.
11. Kapri, U. C. (2017). Impact of multimedia in teaching of science. *International Journal of Advance Research and Innovative Ideas in Education*, 3(4), 2179-2187, https://ijariie.com/adminuploadpdf/IMPACT_OF_MULTIMEDIA_IN_TEACHING_OF_SCIENCE_ijariie6298.pdf.
12. Khamparia, A., & Pandey, B. (2020). Association of learning styles with different e-learning problems: a systematic review and classification. *Education and Information Technologies*, 25(2), 1303-1331, <http://dx.doi.org/10.1007/s10639-019-10028-y>.
13. Nachimuthu, K., & Vijayakumari, G. (2007). Quality Issues and Standards of E-Content. *Journal of Educational Technology*, 4(3), 8-12, <https://files.eric.ed.gov/fulltext/EJ1069250.pdf>.
14. Rana, s., & singh, n. (2020). A Study of e-content through e-learning. *The NCERT and no matter may be reproduced in any form without the prior permission of the NCERT.*, 45(4), 27, <https://ncert.nic.in/pdf/publication/journalsandperiodicals/journalofindianeducation/JIE-February2020.pdf>.
15. Rani, S. (2013). Effectiveness of e-content strategy in teaching science at upper primary level. *Council of edulight*, <http://dx.doi.org/10.7763/IJiet.2016.V6.766>.
16. Rekha, N., & Muthuchamy, I. (2013). Development and Validation of E-Content on DNA Replication in Botany at Higher Secondary Level. *Group*, 20(13.5), 3-35, <https://www.ijr.org/research-paper-0613.php?Rp=P181419>.
17. Satyaprakasha, C. V., & Sudhanshu, Y. (2014). Effect of multimedia teaching on achievement in Biology. *International Journal of Education and Psychological Research (IJEPR)*, 3(1), 43-45, <https://www.semanticscholar.org/paper/Effect-of-Multi-Media-Teaching-on-Achievement-in-Satyaprakasha/27db323794a04d324aaec46e3457c91d2c9b3f3b>.
18. Sedlmeier, P., Tipandjan, A., & Jänchen, A. (2016). How persistent are grammatical gender effects? The case of German and Tamil. *Journal of Psycholinguistic Research*, 45, 317-336, <https://doi.org/10.1007/s10936-015-9350-x>.
19. Selvaganapathy, R., & Benjamin, A. (2019). Impact of E-Content on Learning Chemistry at Higher Secondary Level. *Shanlax International Journal of Education*, 7(4), 70-72, <https://files.eric.ed.gov/fulltext/EJ1245198.pdf>.
20. Singh, J. (2016). Acceptance of technology-enhanced learning: a study among technical students in India (Doctoral dissertation, Thesis, Indian Institute of Management, Indore), <https://www.iimdr.ac.in/wp-content/uploads/Acceptance-of-Technology-Enhanced-Learning-A-Study-among-Technical-Students-in-India.pdf>.
21. Thakur, G. R. (2014). Training and Effectiveness of Multimedia E-Content Based on ADDIE Model Prepared by Student Teachers in Economics for the Students of STD. IX. *Online Submission*, <https://files.eric.ed.gov/fulltext/ED586172.pdf>.
22. Vaishnav, R., & Parage, P. (2013). Innovative instructional strategies interactive multimedia instruction and computer aided instruction for teaching biology. *Voice of Research*, 2(2), 1-4, https://www.academia.edu/85645600/Innovative_Instructional_Strategies_Interactive_Multimedia_Instruction_and_Computer_Aided_Instruction_for_Teaching_Biology?Uc-sb-sw=17164893.
23. Yujia, P. (2020). The Impact of Multimedia Teaching Methods on High School Teachers in China. *The Frontiers of Society, Science and Technology*, 2(18), <https://dx.doi.org/10.25236/FSST.2020.021817>.