



INTEGRATING E-CONTENT TO ENHANCE STUDENT ACHIEVEMENT IN SOCIAL SCIENCE: EXPERIMENTAL EVIDENCE ALIGNED WITH NEP-2020

A. MANIKANDAN, M.A., M.Ed., M.A.,
Ph.D. Research Scholar, School of Education,
(VISTAS) VELS University, Chennai,
email - manikandan.btss@gmail.com
Mobile: 8072109576

Dr. S. POONGUZHALI, Ph.D.,
Research Supervisor
Assistant Professor in Education
School of Education,
Vels (VISTAS) University, Chennai

Abstract

This study examines the effectiveness of e-content in enhancing interest and critical thinking skills among IX standard students in Social Science in the Erode district, Tamil Nadu. Aligned with the National Education Policy (NEP) 2020, which promotes digital pedagogy, this research addresses the need for interactive learning tools in abstract subjects.

A total of 60 students were selected using simple random sampling and divided equally into experimental and control groups. A quasi-experimental pre-test-post-test control group design was employed to measure outcomes. The experimental group received instruction through validated e-content modules, while the control group followed traditional lecture-based methods. Data were analyzed using mean, standard deviation, and t-tests (paired and independent samples).

The results demonstrated a statistically significant difference in post-test interest scores, with the experimental group (Mean = 89.13) outperforming the control group (Mean = 76.53). Furthermore, the experimental group showed a substantial improvement in critical thinking skills from pre-test (Mean = 52.63) to post-test (Mean = 90.93), significantly surpassing the control group's post-test performance. These findings confirm that e-content-based teaching effectively stimulates student interest and fosters higher-order thinking skills. The study recommends the systematic integration of e-content in secondary education to create equitable and engaging learning experiences.

Keywords: E-content, Interest, Critical Thinking, Social Science, NEP 2020, ICT in Education.

1. Introduction

In the evolving landscape of education, the integration of Information and Communication Technology (ICT) has redefined teaching and learning practices. E-content, which includes multimedia tools such as videos, animations, text, and interactive applications, offers a more personalized and engaging learning experience. This is especially beneficial in Social Science, where topics are often abstract and fact-heavy. By using e-content, abstract concepts can be visualized, making learning more concrete and retaining student interest.



The National Education Policy (NEP) 2020 promotes the use of technology to provide inclusive and effective education. In Tamil Nadu, initiatives like smart classrooms and platforms such as DIKSHA have been introduced to support this transformation. However, there is still limited empirical evidence on the effectiveness of e-content, particularly in semi-urban and rural school environments.

2. Problem Statement

Despite reforms and increasing access to ICT, Social Science instruction remains largely lecture-based in many schools. This traditional approach often leads to low engagement and poor academic outcomes. The study aims to investigate whether integrating e-content can enhance learning and achievement levels in Social Science among IX standard students in Erode district.

3. Rationale for the Study

This study is essential due to the following reasons:

- NEP 2020's focus on digital pedagogy.
- The need to make Social Science learning more engaging and interactive.
- The necessity for ICT tools that are teacher-friendly.
- The lack of localized studies in Tamil Nadu on the impact of e-content.

4. Delimitation of the Study

This research is limited to:

- IX standard students following the Tamil Nadu State Board curriculum.
- Select government-aided and private schools in Erode district.
- One e-content module developed and validated by the researcher.

5. Objectives of the Study

1. To compare the post-test interest scores between the Control Group and Experimental Group to assess the role of e-content in stimulating students' interest in Social Science.
2. To compare the pre-test and post-test critical thinking scores of students in the Experimental Group to measure the impact of e-content on developing critical thinking skills.
3. To compare the post-test critical thinking scores between the Control Group and Experimental Group to determine differences in critical thinking skill development due to e-content teaching.

6. Hypotheses of the Study

1. 18. There is no significant difference in post-test interest scores between the control group and the experimental group
2. 19. There is no significant difference between the pre-test and pos-test critical thinking scores of students in the experimental group.



3. 20. There is no significant difference in post-test critical thinking scores between the control group and the experimental group

7. Limitations of the Study

- Long-term knowledge retention was not evaluated.
- External factors such as motivation and home environment were not controlled.
- Findings cannot be generalized beyond the selected sample and region.

8. Methodology

The study employed a quantitative, experimental research design focused on identifying the causal relationship between e-content and student performance. A quasi-experimental design with a pre-test and post-test for both control and experimental groups was used.

8.1 Design of the Study

The research design was based on a pre-test and post-test control group format. Both groups were assessed using a Criterion Referenced Test before and after the intervention. The experimental group received e-content instruction, while the control group followed traditional teaching.

8.2 Sample of the Study

The study included 60 IX standard students selected through simple random sampling from Tamil Nadu State Board schools in Erode district. Thirty students were placed in the experimental group and thirty in the control group.

8.3 Variables of the Study

- Independent Variable: E-content developed for instructional use.
- Dependent Variable: Students' academic achievement in Social Science.
- Demographic Variables: Gender, Locality, Parents Income and prior computer knowledge.

8.4 Procedure of the Study

Both groups took a pre-test to determine baseline knowledge. The experimental group underwent 15 sessions using the developed e-content, while the control group received conventional instruction. A post-test was administered afterward, and results were analyzed.

8.5 Statistical Techniques Used

The data were analysed using:

- Descriptive Statistics: Mean and Standard Deviation.
- Inferential Statistics: Independent sample t-test.
- Graphical Representation: Bar graphs to illustrate score differences.

9. Review of Literature

- Traditional and e-content pedagogies have distinct implications for social science education. **Barton and Levstik (2004, p. 36)** emphasized the strengths of traditional teaching methods in promoting historical literacy. However, they



acknowledged the shortcomings of these methods in engaging modern learners who require interactive and dynamic learning experiences. Supporting this critique, **Freire (1970, p. 58)** described traditional pedagogy as a "banking model," where students are treated as passive recipients of information. Freire argued that such methods suppress creativity and critical thinking, essential skills in social science education.

- E-content pedagogy has emerged as a promising alternative. **Mayer (2005, p. 113)** introduced the Cognitive Theory of Multimedia Learning, asserting that the integration of visual and auditory elements enhances understanding and retention. Building on this, **Clark and Mayer (2016, p. 92)** demonstrated that well-designed e-content significantly improves learner motivation and engagement, particularly when it adheres to multimedia principles.
- The specific needs of social science education further highlight the potential of e-content. **Nash (1996, p. 25)** advocated for experiential learning approaches to develop civic competence and ethical reasoning in students. E-content, with its ability to simulate real-world scenarios and foster inquiry-based learning, aligns well with these educational objectives. **Tripathi, Sharma, and Singh (2021, p. 119)** reinforced this by showing how digital resources in science education increased student engagement and conceptual clarity, findings that are transferable to social science contexts.
- Despite these benefits, challenges to the adoption of e-content persist. **Mishra and Panda (2007, p. 45)** identified technological infrastructure deficits and insufficient teacher training as major barriers in Indian schools. Without addressing these issues, the integration of e-content risks exacerbating the digital divide. Innovative approaches, such as gamification, can mitigate some of these barriers. **Deterding et al. (2011, p. 10)** highlighted how gamified learning environments motivate students by making tasks more engaging and enjoyable.
- The potential of hybrid learning models is also noteworthy. **Means et al. (2010, p. 48)** suggested that blending traditional and e-content methods yields superior outcomes compared to relying on either approach exclusively. Such hybrid models can combine the structure of traditional pedagogy with the interactivity of e-content, creating a balanced and effective learning environment.
- Finally, the policy framework provided by the **Ministry of Education (2020, p. 14)** under NEP 2020 underscores the importance of digital tools in achieving equitable and high-quality education. By addressing infrastructural challenges and emphasizing teacher training, the policy lays the groundwork for integrating e-content into mainstream education.



- This review underscores the potential of e-content pedagogy in enhancing social science education while also recognizing the importance of addressing infrastructural and pedagogical challenges to ensure its effective implementation.

10. Data Analysis and Interpretation

HYPOTHESIS-1

- There is no significant difference in post-test interest scores between the control group and the experimental group

Table 10.1

Level of significant difference in post-test interest scores between the control group and the experimental group

Control Group and Experimental Group Interest			
Sl. No	Description	C.G. Post Test	E.G. Post Test
1	Number of Items	20	20
2	Mean	76.53333333	89.13333333
3	Median	76	89
4	Mode	75	90
5	Standard Deviation	2.012603963	2.445732854
6	Highest Score	80	93
7	Lowest Score	73	81
8	Range	7	12
9	T Test	6.48121E-30	

The presented data compares the post-test interest scores between the control group and the experimental group after implementing an educational intervention involving e-content-based teaching. Both groups were evaluated using a test comprising 20 items, ensuring parity in assessment tools. The mean score for the control group was 76.53, whereas the experimental group recorded a substantially higher mean of 89.13. This difference suggests that the students exposed to e-content demonstrated a higher level of interest in the subject matter.

Further, the median and mode scores for the control group were 76 and 75 respectively, compared to 89 and 90 in the experimental group, reinforcing that a larger

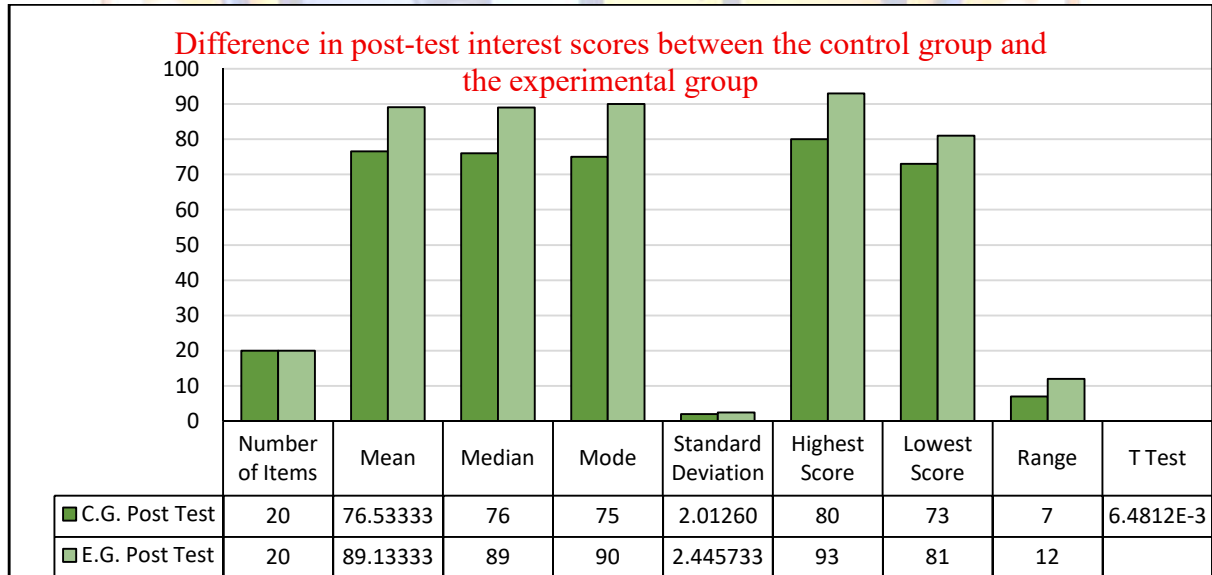
number of students in the experimental group achieved higher interest scores. While the standard deviation of the control group (2.01) was slightly lower than that of the experimental group (2.45), the higher scores in the experimental group still indicate greater engagement despite slightly higher variability.

The highest score in the control group was 80, and the lowest was 73, giving a range of 7. In contrast, the experimental group ranged from 81 to 93, giving a range of 12. Although the experimental group showed a wider range, its minimum score (81) was higher than the control group’s maximum score (80) — a strong indicator of superior overall performance in interest.

Most importantly, the T-test value of 6.48121E-30 is significantly below the 0.05 threshold, indicating a very highly significant statistical difference between the interest levels of both groups. This p-value confirms that the observed improvement in the experimental group is not due to chance. So the NULL Hypothesis is Rejected.

Figure 10.1

Bar Chart Shows the significant difference in post-test interest scores between the control group and the experimental group



HYPOTHESIS-2

- There is no significant difference between the pretest and post-test critical thinking scores of students in the experimental group



Table 10.2

Level of significant difference between the pre-test and post-test critical thinking scores of students in the experimental group

Experimental Group Critical Thinking Scores			
Sl. No	Description	Pre Test	Post Test
1	Number of Items	20	20
2	Mean	52.63333	90.93333
3	Median	52	91
4	Mode	51	91
5	Standard Deviation	3.232201	2.333169
6	Highest Score	59	95
7	Lowest Score	46	85
8	Range	13	10
9	T Test	1.33674E-29	

The critical thinking performance of students in the experimental group was assessed using a 20-item test.

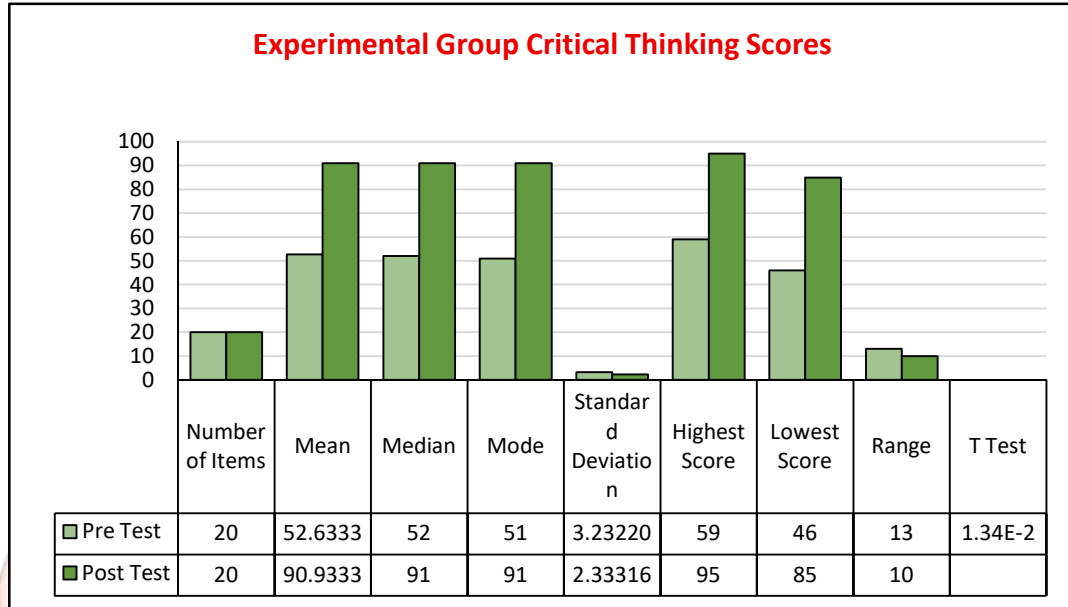
The critical thinking performance of students in the experimental group was assessed using a 20-item test both before and after the intervention. The mean score increased significantly from 52.63 in the pre-test to 90.93 in the post-test, reflecting a substantial improvement in students' critical thinking skills.

The median and mode values also showed a positive shift, moving from 52 and 51 in the pre-test to 91 in both cases in the post-test, indicating a consistent rise in overall performance. The standard deviation decreased from 3.23 to 2.33, which suggests that students' scores became more concentrated around the mean, with less variability in performance after the intervention.

Additionally, the range of scores narrowed from 13 to 10, and both the highest and lowest scores improved — from 59 to 95 (highest) and 46 to 85 (lowest). This indicates that not only the top performers but also the weaker students showed notable progress in their critical thinking abilities. There is a statistically significant difference between the pre-test and post-test critical thinking scores of students in the experimental group. The intervention significantly improved critical thinking performance. So, the null hypothesis is Rejected.

Figure 10.2

Bar Chart Shows the significant difference between the pre-test and post-test critical thinking scores of students in the experimental group



HYPOTHESIS-3

- There is no significant difference in post-test critical thinking scores between the control group and the experimental group

Table 10.3

Level of significant difference in post-test critical thinking scores between the control group and the experimental group

Sl. No	Description	C.G.Post Test	E.G.Post Test
1	Number of Items	20	20
2	Mean	79.63333333	90.93333333
3	Median	79.5	91
4	Mode	81	91
5	Standard Deviation	3.285110961	2.333169124
6	Highest Score	87	95
7	Lowest Score	75	85
8	Range	12	10



9	T Test	3.32207E-14
---	--------	-------------

Both groups were evaluated using the same 20-item test. The mean score for the control group was 79.63, while the experimental group achieved a higher mean of 90.93, suggesting a notable improvement in the group exposed to the intervention (likely e-content-based teaching).

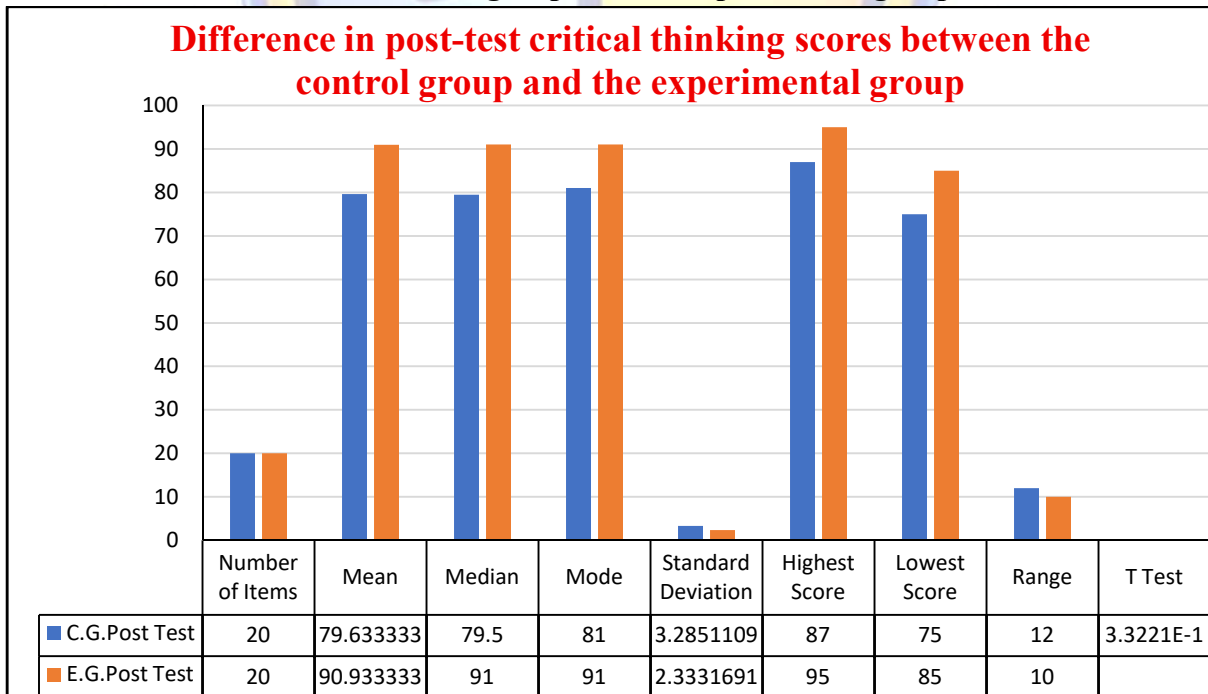
The median score (79.5 for C.G. and 91 for E.G.) and mode (81 for C.G. and 91 for E.G.) also show that the experimental group consistently scored higher. This implies most students in the experimental group performed at or near the higher end of the scale, while the control group's scores were relatively lower and more varied.

The standard deviation was higher in the control group (3.29) compared to the experimental group (2.33), indicating that the experimental group's scores were more consistent and clustered around the mean, while the control group had greater variability. There is a statistically significant difference in the post-test critical thinking scores between the control group and the experimental group.

Thus, the null hypothesis "There is no significant difference in post-test critical thinking scores between the control group and the experimental group" is rejected.

Figure 10.3

Bar Chart Shows the significant difference in post-test critical thinking scores between the control group and the experimental group





11. Findings

1. The experimental group showed significantly higher interest scores than the control group in the post-test. Their average scores, median, and mode were all higher, and even the lowest score in the experimental group was above the highest in the control group. The T-test result confirms that this difference is statistically very highly significant. Therefore, e-content-based teaching effectively increased students' interest in the social science subject.
2. To validate whether the observed improvement was statistically significant, a paired t-test was conducted. The resulting p-value was 1.33674E-29, which is far below the standard significance threshold of 0.05. This extremely low p-value strongly confirms that the improvement in critical thinking scores from pre-test to post-test is not due to random chance but is statistically significant. Overall, the findings clearly demonstrate that the experimental intervention — likely involving e-content was highly effective in enhancing the critical thinking skills of the students. The data supports that the intervention led to consistent, uniform, and meaningful learning gains across the experimental group.
3. The experimental group significantly outperformed the control group in post-test critical thinking scores. Central tendency measures (mean, median, mode) were all higher for the experimental group. The variability of scores was lower in the experimental group, indicating more consistent performance. The p-value confirms statistical significance, meaning the improvement is not due to chance. The intervention (likely e-content) was effective in enhancing critical thinking skills among students. The experimental group performed significantly better, and the difference in scores did not occur by chance. This supports the effectiveness of the educational intervention e-content teaching method in improving critical thinking skills.

12. Recommendation

The findings clearly indicate that the use of e-content in Social Science teaching resulted in a substantial improvement in students' post-test interest and critical-thinking scores when compared to traditional instructional methods. Since both interest and critical-thinking showed statistically significant enhancement in the experimental group, e-content based teaching should be formally integrated as a regular pedagogical approach rather than being used occasionally or experimentally. It is therefore recommended that schools systematically adopt structured e-content modules for Social Science learning at the secondary level, as such digital instructional practices have been empirically proven to elevate student engagement, participation and higher-order thinking in the present study.



14. Conclusion

The study confirms that e-content is highly effective in improving Social Science achievement and student attention. While computer knowledge had no significant impact on outcomes, the use of e-content led to notable gains in student engagement and consistent performance across learners. The experimental group outperformed the control group significantly, supporting the effectiveness of digital interventions. These findings validate the role of ICT in transforming classroom learning and reinforce the need for schools to adopt technology-integrated approaches. For sustained success, digital equity, teacher training, and learner-centered content must be prioritized.

References

- Aggarwal, J. C. (2019). *Essentials of educational technology* (2nd ed.). Vikas Publishing House.
- Arora, A. (2020). Digital learning and educational outcomes: A rural-urban perspective. *International Journal of Educational Development*, 75, 102198. <https://doi.org/10.1016/j.ijedudev.2020.102198>
- Kumar, S., & Sharma, R. (2021). E-learning effectiveness in schools during COVID-19 lockdown. *Education and Information Technologies*, 26(5), 4891–4909. <https://doi.org/10.1007/s10639-021-10572-x>
- Mishra, L., Gupta, T., & Shree, A. (2020). Online teaching-learning in higher education during lockdown. *Educational Research International*, 2020, 1–8. <https://doi.org/10.1155/2020/8895708>
- Ministry of Education, Government of India. (2020). *National Education Policy 2020*. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
- Singh, V., & Thurman, A. (2019). How e-learning helps students learn effectively: A case of blended learning. *International Journal of Educational Technology in Higher Education*, 16(1), 1–23. <https://doi.org/10.1186/s41239-019-0176-8>
- UNESCO. (2021). *Leveraging technology to achieve learning equity*. <https://unesdoc.unesco.org/ark:/48223/pf0000378309>
- Yadav, R., & Mehta, D. (2022). Analyzing digital learning inequality in Indian schools. *Journal of Educational Research and Practice*, 12(3), 45–54.
- Zhao, Y., & Frank, K. A. (2003). Factors affecting technology uses in schools: An ecological perspective. *American Educational Research Journal*, 40(4), 807–840. <https://doi.org/10.3102/00028312040004807>



- Selwyn, N. (2016). *Education and technology: Key issues and debates* (2nd ed.). Bloomsbury Academic.
- Clark, R. C., & Mayer, R. E. (2016). *E-learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning* (4th ed.). Wiley.

