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Development of interactive e-content to enhance listening skill and language comprehension among secondary school students

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ABSTRACT

The present study aimed to develop interactive e-content, conduct expert validation, and examine the appropriate level. The researchers used a purposive sampling technique to select the sample of 100 secondary school students and 35 teachers from the Kerala state scheme. The researchers adopted the analysis, design, development, implementation, and evaluation (ADDIE) model to develop interactive e-content. The study employed two quantitative methods. Firstly, the study administered expert validation sheets to three content and two media experts to validate developed interactive e-content. The study utilized the percentage analysis to evaluate the results of the expert validation sheets. Secondly, the study administered a survey questionnaire to 100 secondary school students and 35 teachers to examine the appropriate level of interactive e-content. The study employed the correlation method to analyze the questionnaire results, examining the strength and direction of relationships between variables. The average score of content expert validation is 95.5% and media expert validation is 91.5% confirm that the developed interactive e-content is highly valid and appropriate. A major challenge for the researchers was the insufficient internet speed in rural areas of Kerala. The study recommends that teachers have to develop interactive multimedia teaching-learning aids to improve listening, speaking, reading, and writing (LSRW) among students.

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1. INTRODUCTION

Interactive e-content is an essential pedagogical tool that significantly enhances effective teaching and learning experiences. In today's digital age, interactive e-content offers dynamic and engaging experiences that capture learners' attention and deepen their comprehension [1]. Unlike traditional static text and images, interactive e-content revolutionizes various elements with interactive videos, audios, quizzes, simulations, pictures, games, and multimedia [2]. These features actively involve learners, boosting motivation and knowledge retention [3]. By promoting active learning and retention, interactive e-content enables learners to develop skills like problem solving, critical thinking, and dynamic engagement [4]. Personalized exploring journeys allow learners to study at their own pace and receive immediate feedback, which improves self-reflection [5], spatial memory and psychomotor skills, and learning strategy adjustments [6]. Interactive e-contents offer audio-visual interactive discourses, online calculators and language labs, interactive tests, and gamification [7]. These interactive e-contents satisfy the needs of various learners by active learning through listening, observing the content, and engaging with the online quizzes [8]. Verbal models enhance auditory processing ability, while symbolic models trigger visual comprehension capability [9].

Interactive e-content delivers unique learning materials, enhances learner involvement, facilitates active learning, ensures quality learning, and professionalizes teaching [10]. Interactivity with e-content and teacher-student interaction make learning interesting and dynamic, with interactive quizzes boosting student participation [11]. The technological integration introduces innovation into the teaching and learning process, transforming the learning environment and accomplishing the goals of teaching [12]. Interactive learning content enriches language patterns, vocabulary, pronunciation, syntax, semantics, and grammar in the English language [13]. Interactive principles, learning exercises, and multi-level engagement cater to deliver diverse learning styles, increasing students' receptive capabilities and productive abilities of the students [14]. The easy accessibility, systematic organization, and logical structure of interactive e-content cultivate motivation, reflective thinking, and an optimistic attitude [15].

Developing interactive e-content becomes essential in this context, as it provides more engaging, personalized, and flexible learning experience [16]. This shift can enhance student engagement, improve knowledge retention, and accommodate diverse learning styles, ultimately bridging educational gaps and democratizing access to quality education across the country [17]. The usage of multimedia can stimulate all the senses of the students, thus maximizing the educational outcome [18]. Despite its benefits, there has not been a serious approach to implement multimedia in the educational arena in India. This could have various reasons such as orthodox mentality of teachers, reliance on traditional chalk and talk method, lack of technological awareness and support and supervision from authorities. Teachers, in the field of science, technology and engineering utilize the benefits of multimedia practices [19], but in language and art studies, they are often reluctant to implement its usage. Additionally, there are no serious efforts or risks undertaken by teachers to develop multimedia packages like interactive e-content [20]. Many are not aware about various apps and interactive free platforms. There is a lack of technological education and practical usage. Therefore, the research questions are:

- How can listening skills and language comprehension be enhanced through the development of interactive e-content in the English language among secondary school students?
- How can the developed interactive e-content be validated?
- Is the developed interactive e-content appropriate for enhancing listening skills and language comprehension among secondary school students?

In addition, the objectives of the study are:

- To develop interactive e-content in English language to enhance listening skills and language comprehension among secondary school students.
- To conduct expert validation of the developed interactive e-content.
- To examine the appropriate level of interactive e-content in English language to enhance listening skill and language comprehension among secondary school students.

Interactive e-content is an emerging trend in the modern technological era. Most studies and developments in interactive e-content have been focused on science learning. A few studies have explored its role in language enhancement, and no significant research has been conducted on using interactive e-content to improve listening skills and language comprehension among secondary school students. This study makes a distinct contribution by developing, validating and implementing 20 interactive e-content modules designed to improve both listening skills and language comprehension in secondary school students. The researchers developed interactive e-content modules based on the English textbook of the Kerala state scheme. These modules incorporate four types of interaction: interaction with video content, audio content, teacher-student interaction, and peer interaction. In line with the objectives of National Educational Policy (NEP) 2019, the e-content efficiently integrates technology into the educational process, providing an innovative, student-centered resource for language development. The novelty of this study lies in the development of interactive e-content that not only targets listening skills and language comprehension simultaneously but also integrates immediate feedback and interactive quizzes to sustain learners' attention and strengthen focus, features rarely combined in existing language resources. Unlike traditional chalk-and-talk methods that limit active language use, this interactive e-content creates dynamic, student-centered learning environments where technology supports engagement, motivation, and self-paced learning. The modules are thoughtfully designed to promote inclusivity, cater to diverse learner needs, and align with modern educational goals such as fostering digital literacy, critical thinking, and collaboration key priorities of NEP 2019 [21].

2. METHOD

Developing interactive e-content involves several steps and requires addressing various factors to ensure its effectiveness. It is essential to evaluate both the validity and the appropriate level of the developed e-content to meet learning objectives. The study aimed to develop interactive e-content, find expert validation, and assess the appropriate level of the interactive e-content. Institutional ethical clearance was

obtained, and all ethical guidelines were strictly followed during data collection. The researchers utilized a purposive sampling technique for the selection of sample. The sample of the study consists of 100 secondary school students and 35 teachers following Kerala state scheme. In the study, the researchers developed interactive e-content and used quantitative methods.

2.1. Development of interactive e-content

The core aim of the study is the development of interactive e-content, designed to enhance listening skills and language comprehension among secondary school students. Addressing personalized learning tailored to the needs and interests of students is crucial, as it enhances student engagement and fosters a positive and supportive learning atmosphere in the classroom. The researchers incorporated four key types of interaction: teacher-student interaction, learner-video interaction, peer interaction, and interaction with audio material. Using the analysis, design, development, implementation, and evaluation (ADDIE) model [22], the researchers structured the development process to create this learning package. The phases of this development are detailed in Table 1.

Table 1. Phases of the development of interactive e-content

Phase	Phases of development of interactive e-content ADDIE model
Analysis phase	The target group of the researchers is secondary school students. The learner's age, listening skills, language comprehension considered to develop interactive e-content on listening skill and language comprehension in English language. The researchers decided develop, conduct expert validation, and examine the appropriate level of the interactive e-content in English language to enhance listening skill and language comprehension among secondary school students.
Design phase	Researchers planned to use H5P for the construction of interactive e-content. The sequences and script for e-content, videos, quizzes, face to face interaction of the teacher, music, audio listening content, language games, picture identification were prepared and lesson transcript.
Development phase	Researcher prepared interactive e-content with H5P which incorporates video and audio content, interactive quizzes, music, language games, picture identification, phonetics exercises, synonyms, homonyms, word games, group activities, hinds for collaborative learning, and face to face interaction of the teacher.
Implementation phase	Researcher instructed with interactive e-content to 8th standards students to improve the listening skill and language comprehension of the secondary school students.
Evaluation phase	Interactive e-content validated by subject experts and modified it according to their suggestions.

2.2. Quantitative methods

The quantitative methods aimed to analyze the relationship between variables, using empirical data to evaluate the effectiveness of the intervention. This session includes two quantitative methods: the expert validation sheets and survey questionnaire to examine the appropriate level of the developed interactive e-content. For the first quantitative method, the researchers employed two expert validation sheets, one for content experts and another for media experts. For the second method, the researchers employed a survey questionnaire for 100 secondary school students and 35 secondary school teachers for data collection.

2.2.1. Expert validation of the interactive e-content

The researchers prepared an expert validation sheet for the validation of the developed interactive e-content. The researchers conducted a pilot study with one language expert and one media expert of the content and media validation sheets. The researchers modified according to their suggestions and prepared the final draft. The study employed purposive sampling techniques to select five experts. Among them, two were teacher educators from the Department of English; one was senior associate professors from the Department of English; and two were multimedia practitioner from the Department of Educational Technology. The researchers constructed two expert validation sheets to ensure the validity of the developed interactive e-content: one for content expert practitioner and one for media expert practitioner. The study confirmed the validity of this expert validation sheet through evaluation by a panel of experts. The researchers gave content expert validation sheets to three content expert practitioners and media expert validation sheets to two media expert practitioners and collected responses. The study analyzed the collected data using the descriptive statistics based on percentage. It helps the researchers to evaluate the validity of developed interactive e-content.

$$(P = \frac{F}{N}\ X\ 100) \quad (1)$$

Where, P=respondents' percentage score for item; F=respondents' score for item; N=highest score for item.

2.2.2. Examine the appropriate level of interactive e-content

The study employed a survey questionnaire to investigate students' and teachers' responses to the interactive e-content and determine the appropriate level of interactive e-content. The items of questionnaire include 15 statements related to evaluate the appropriateness of the developed interactive e-content. The researchers conducted pilot study for secondary school students and teachers. The statements of the questionnaire modified according to the pilot study. Researchers employed purposive sample techniques to select secondary school teachers and the school, which was equipped with computer lab, Wi-Fi connection, personal audio facilities, and electricity. The sample of the study consists of 100 students from 8th standard and 35 secondary school teachers. Researchers designed a survey questionnaire to collect responses from students and teachers regarding the interactive e-content developed by researchers. Students and teachers can reveal their experience of teaching and learning with interactive e-content using questionnaire that includes the categories: excellent, good, fair, poor, and very poor. The study ensured face and content validity of the survey questionnaire with a panel of experts. Table 2 represents the items of survey questionnaire.

Table 2. Survey questionnaire

Sl. No.	Items	Excellent (5)	Good (4)	Fair (3)	Poor (2)	Very poor (1)
1	Interactive e-content is an enhanced learning package.					
2	Interactive e-content provides self-paced learning environment.					
3	Interactive e-content makes active and enthusiastic.					
4	Interactive e-content facilitate acquisition of English language skills.					
5	Interactive e-content imprints structure of English language among learners.					
6	I explore realistic learning environment through virtual field trip in interactive e-content.					
7	I find it easy to understand the content of interactive e-content through videos, animations, and images.					
8	I engage with interest through interactive quizzes, immediate feedback, and activities.					
9	I actively listen to the audio content					
10	I exercise phonetic, intonation, pronunciation through interactive e-content.					
11	I can enhance my retention through seeing, hearing, and interacting with materials.					
12	I can develop the vocabulary through reading text, word construction games, and word tree.					
13	I can understand the meaning of words, sentences, and gist of the passage.					
14	I enjoy attending more interactive e-content based classes.					
15	Interactive e-content allows me to pause and repeat difficult sections according to my learning style.					

The researchers provided interactive e-content based classes to 100 students from 8th standard and 35 secondary school teachers. The researchers conducted this study by offline mode. The researchers distributed the survey questionnaire and informed necessary guidelines about how to fill their responses. The researchers allowed 45 minutes to fill it. After that, the researchers collected their questionnaire and gathered their responses. The gathered data encrypted and stored on secure drives, accessible only to the researchers. The data analyzed using the descriptive statistics based on mean score and found the correlation between the responses of 100 students and 35 secondary school students.

$$(r = \frac{\sum(x_i - \bar{x})\,(y_i - \bar{y})}{\sqrt{\sum(x_i - \bar{x})^2\ \sum(y_i - \bar{y})^2}}) \quad (2)$$

Where:
r=correlation coefficient
x_i=values of x- variable
$\bar{x}$=mean of the value of the x- variable
y_i=value of the y- variable in a sample
$\bar{y}$=mean of the value of the y- variable

3. RESULTS

3.1. Results of the expert validation of the interactive e-content

The researchers adopted ADDIE model and thus developed interactive e-content for enhancing listening skill and language comprehension for 8th standard students. The content experts revealed the developed interactive e-content is useful to enhance listening skill and language comprehension. The media experts mentioned that the developed interactive e-content is very useful to improve student engagement in the classroom. The developed interactive e-content provide the active involvement of students in the classroom and help to improve their language proficiency. The results of the expert validation sheets represented the Tables 3 and 4.

Table 3. Content expert validation

Expert validation	Indicators	Percentage (%)
Content expert		
	Language proficiency	94.33
	Applicability	95
	Vocabulary	95.33
	Accuracy	96.33
	Assessment	95
	Integration	97
Average score of content expert validation		95.5

Table 4. Media expert validation

Expert validation	Indicators	Percentage (%)
Media expert		
	Technical performance	89.5
	Connectivity	90.5
	Interactivity	92.5
	Competence	92
	Engagement	92
	Accessibility	92.5
Average score of media expert validation		91.5

Table 3 shows the results from the content expert validation sheets. The average mean score of language proficiency is 94.33%, applicability is 95%, vocabulary is 95.33%, accuracy is 96.33%, assessment is 95% and integration is 97%. The average mean score of content expert validation is 95.5%. This shows the developed interactive e-content is valid and useful for secondary school students. The average mean score of media expert validation is 91.5%. The result of content expert validation reveals that the developed interactive e-content for enhancing listening skill and language comprehension is rated as 'very good' and hence it is valid for teaching and learning process for secondary school students.

Table 4 shows the results from the media expert validation sheets. The average mean score of technical performance is 89.5%, connectivity is 90.5%, interactivity is 92.5%, competence is 92%, engagement is 92% and accessibility is 92.5%. The average mean score of media expert validation is 91.5%. This indicates the developed interactive e-content is valid and attractive for secondary school students. These results of media expert validation specify that the developed interactive e-content for enhancing listening skill and language comprehension is rated as 'very good' and is therefore valid for teaching and learning process among secondary school students.

3.2. Results of survey questionnaire

The researchers collected and analyzed the results of survey questionnaire from 100 secondary school students and 35 secondary school teachers. Survey reveals that the developed interactive e-content is appropriate for improving listening skill and language comprehension for 8th standard students. The collected data from 35 secondary school teachers discloses that the developed interactive e-content is useful to enrich listening skill and language comprehension among secondary school students. The results of the survey questionnaire of 100 students are presented in Table 5, while 35 secondary school teachers' data is presented in Table 6.

Table 5 shows the results from the survey questionnaire. The average mean score of students' response is 4.68. This result indicates that the developed interactive e-content is rated as 'very good' and, therefore is highly appropriate among secondary school students. Table 6 shows the results from the survey questionnaire of 35 secondary school teachers. The average mean score of secondary school teachers' is 4.62. This result indicates that the developed interactive e-content is rated as 'very good' and, therefore is highly appropriate among secondary school students. Figure 1 explicitly illustrates the mean score for each question, revealing a consistent pattern of correlation across items. This indicates that each item is aligned and that the interactive e-content is both useful and applicable for secondary school students.

Table 5. Result of survey questionnaire of 100 students

Question no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Mean	4.81	4.20	4.61	4.87	4.27	4.78	4.92	4.73	4.58	4.50	4.87	4.69	4.75	4.85	4.80
SD	0.38	0.63	0.58	0.34	0.60	0.47	0.27	0.44	0.53	0.59	0.34	0.58	0.43	0.34	0.40
												Average mean score			4.68

Table 6. Result of survey questionnaire of 35 secondary school teachers

Question no.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Mean	4.71	4.32	4.52	4.54	4.32	4.63	4.86	4.65	4.48	4.59	4.78	4.72	4.72	4.83	4.77
SD	0.45	0.47	0.50	0.50	0.47	0.49	0.43	0.48	0.50	0.55	0.42	0.45	0.45	0.38	0.42
													Average mean score		4.62

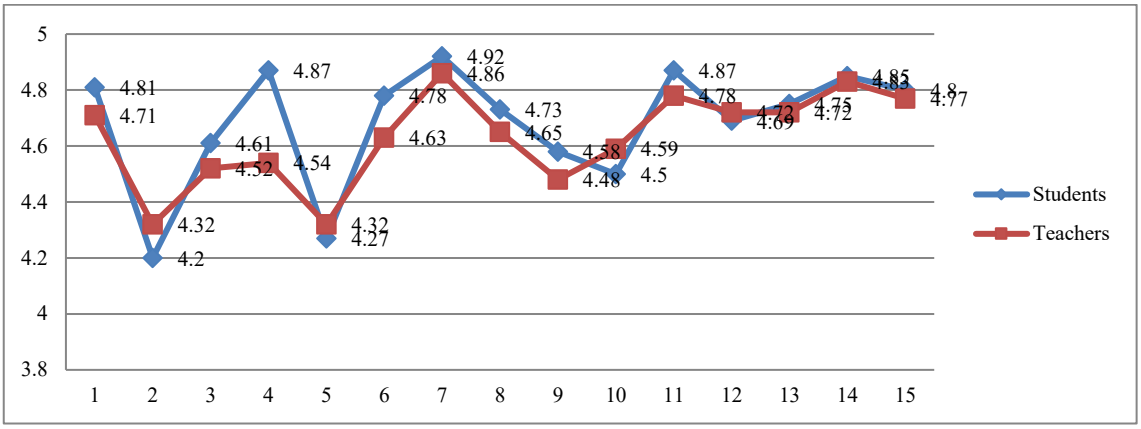

Figure 1. Mean scores of the responses of secondary school students and teachers

Table 7 shows the correlation between the responses of secondary school students and teachers on interactive e-content prepared by the researchers for enhancing listening skill and language comprehension in English language among secondary school students. The average mean score of secondary school students is 4.68, and that of secondary school teachers is 4.62 out of 5. The Pearson correlation value of 0.87 indicates a high correlation between the responses of the students and teachers. This demonstrates that interactive e-content is highly effective in promoting enthusiastic, self-paced, active, and skill-based learning. It also enhances active listening, comprehension, pronunciation, and vocabulary development.

The results of the correlation analysis in Figure 2 show a high correlation between the responses of secondary school students and teachers. The Pearson correlation shows a positive result, that is 0.87 are close to 1. It indicates that there is high correlation between the responses of secondary school students and teachers. The responses of the students and teachers reveal that interactive e-content is appropriate for enhancing vocabulary acquisition through a realistic learning environment and exposure to the structure of the English language and grammar. Additionally, interactive e-content provides immediate feedback, differentiated instruction, and visual-auditory reinforcement, catering to diverse learning styles. It encourages learner autonomy, boosts digital literacy, and fosters critical thinking and engagement through gamified elements, making the learning process more holistic and future-ready.

Table 7. The results of correlation analysis between the responses of secondary school students and teachers

Participants	No.	Mean scores	SD	Correlation
Responses of secondary school students	100	4.68	21.27	0.87
Responses of secondary school teachers	35	4.62	16.79	
0.8<r<1.0 very high correlation				

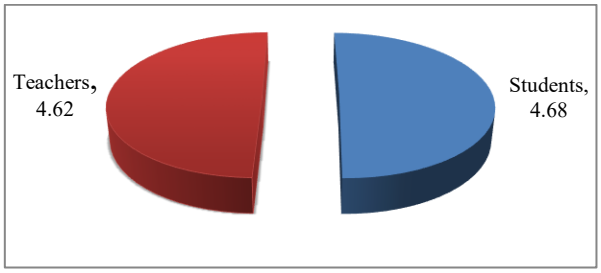

Figure 2. Correlation between the responses of secondary school students and teachers

4. DISCUSSION

Interactive e-content is a powerful educational tool that enhances listening skill and language comprehension among secondary school students. Researchers adopted the ADDIE model to develop interactive e-content, ensuring that it aligned with the needs and requirements of the students by providing clear guidelines and instructions. The study found that the developed interactive e-content enabled students to improve their listening skill. Gjinali and Piri [23] reveal that video and multimedia materials stimulate students to improve their listening skills, with 62.84% of the students "fully agreeing" with this concept. The present study discloses that developed interactive e-content promotes autonomy in learning. Pratiwi and Waluyo [24] found that digital technologies enhance students' autonomy in areas such as language structure, information literacy, and linguistic confidence.

In the present study, the researchers conducted content and media expert validation to assess the validity of the developed interactive e-content. As per the content expert validation, the average mean score of language proficiency is 94.33%, applicability is 95%, vocabulary is 95.33%, accuracy is 96.33%, assessment is 95% and integration is 97%. The average mean score of content expert validation is 95.5%. Based on the media expert validation, the average mean score of technical performance is 89.5%, connectivity is 90.5%, interactivity is 92.5%, competence is 92%, engagement is 92% and accessibility is 92.5%. The average mean score of media expert validation is 91.5%. The results indicate that the average score for content expert validation is 95.5%, while media expert validation received a score of 91.5%. These results reveal that the developed interactive e-content is valid and attractive for secondary school students. The content and media experts rated the developed interactive e-content as 'very good' therefore it is valid for teaching. A similar study conducted by Ghofur and Youhanita [25] reported a media expert validation score of 92%. These results fall under the "good" category, confirming that the developed interactive e-content is both valid and engaging. Mahesti *et al.* [26] developed a learning video that was validated with the assistance of material experts, media experts, and linguists. The average validation score achieved was 97.6%, indicating a high level of quality. Moreover, 86% of students found the alternative learning resources was helpful in supporting the teaching and learning process of English. Samad *et al.* [27] evaluated the validity of interactive presentation media using the content validity index (CVI). The media dimension obtained a score of 0.93, the material dimension scored 0.95, and the educational dimension scored 0.91. These outcomes indicate that interactive media serves as a useful and impactful resource in educational contexts, fostering engaging and dynamic learning experiences.

A quantitative method was employed in this study, utilizing a survey questionnaire to analyze the responses of 100 secondary school students and 35 teachers. The evaluation focused on determining the appropriateness of the interactive e-content in enhancing listening skills and language comprehension. The average mean score from student responses was 4.68, while the mean score from teachers was 4.62 out of 5. These findings indicate that the developed interactive e-content is rated as "very good" and is highly suitable for secondary school students. The results suggest that interactive e-content facilitates the acquisition of language structures, vocabulary, semantics, and syntax while aiding in identifying the gist of the content. A similar study by Heni [28] employed a quantitative survey method to analyze the impact of interactive learning multimedia on speaking and listening skills in an English course. The mean score for listening skills was 77.95 out of 100. Heni [28] concluded that interactive multimedia effectively improves students' listening and speaking skills. Fathoni *et al.* [29] carried out an experimental study with 64 secondary school students. The control group had a mean score of 52.73, whereas the experimental group achieved a mean score of 79.85. A t-test result of 8.145 was calculated. These results suggest that using interactive multimedia significantly improves students' understanding of English vocabulary.

Researchers conducted Pearson correlation analysis to determine the relationship between the responses of secondary school students and teachers. The correlation coefficient ($r=0.87$) indicates a strong positive correlation, suggesting that both students and teachers perceive the interactive e-content as highly appropriate for enhancing listening skills and language comprehension. Similarly, Khojasteh *et al.* [20] used Pearson correlation analysis to examine the relationship between the organization of e-content and multimedia principles ($r=0.859$), the organization of e-content and physical design ($r=0.843$), and physical design and multimedia principles ($r=0.808$). These results demonstrate a high correlation, reinforcing the significance of well-structured e-content in multimedia learning environments.

Students are actively engaged in classroom activities through interactive quizzes, immediate feedback, and other features of interactive e-content. This is evident from the analysis of question 8 in the survey questionnaire, which yielded a mean score of 4.73 for students and 4.65 for teachers (out of 5). These results indicate a strong interest in using interactive e-content for learning. A similar study by Hamdani *et al.* [30] reported a mean score of 3.37 (out of 5) for students' responses to interactive quizzes after implementing Android-based interactive multimedia. This suggests that 84.17% of students value immediate feedback and assessments, reinforcing the effectiveness of interactive e-content in fostering engagement.

Interactive e-content is also perceived as easy to understand through videos, animations, and images. Analysis of the seventh question in the questionnaire revealed a mean score of 4.92 for students and 4.86 for teachers. A study by Septiani *et al.* [9] found that 82.50% of students considered interactive multimedia courseware easy to use. Interactive e-content enhances active and enthusiastic learning. The responses from 100 students and 35 teachers of the present study support this statement, with mean scores of 4.61 and 4.52, respectively, for question 3. Munir *et al.* [31] study suggests that interactive e-content fosters enthusiasm, with material experts rating it 3 out of 4. Interactive e-content enhances retention by engaging students through visual, auditory, and interactive materials, as evidenced in the present study. The analysis of question eleven in the survey questionnaire revealed mean scores of 4.87 from students and 4.78 from teachers, indicating that interactive e-content effectively improves students' retention capacity. A similar study by Winatha and Abubakar [32] supports this finding through an experimental study. In the pre-test of an achievement test, students scored an average of 43.40. However, after exposure to interactive e-content, their post-test scores increased significantly to 82.65. This demonstrates that retention capacity improves through interaction with videos and other multimedia elements.

Our research breaks new ground by harnessing the potential of interactive e-content to revolutionize listening skills and language comprehension in secondary school students. By leveraging cutting-edge technology, the study has created a bespoke learning experience that adapts to individual learners' needs, fostering engagement, autonomy, improved academic outcomes and supporting rural-urban educational equity and the inclusive vision of NEP 2019. This study's findings have significant implications for language education, offering a scalable and replicable model for educators and policymakers to enhance student learning outcomes. By bridging the gap between technology and pedagogy, our research contributes to the development of more effective, efficient, and enjoyable language learning experiences.

5. CONCLUSION

The study underscores the transformative potential of interactive e-content in enhancing listening skills and language comprehension among secondary school students. Despite challenges such as resistance to change and limited technological access in certain regions, the findings highlight the importance of embracing multimedia tools to foster learner engagement, autonomy, and inclusion. To fully realize this potential, the study recommends equipping teachers with the necessary training to create and implement multimedia-rich content and urges policymakers to invest in infrastructure, curriculum reform, and targeted funding. Embracing interactive e-content is not just a pedagogical shift it is a crucial step toward a more equitable, dynamic, and learner-centered educational system.

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AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

The authors declare that there is no conflict of interest regarding this study. They have no financial, personal, or professional affiliations that could have influenced the research process or findings. All aspects of the study were conducted with transparency and academic integrity.

INFORMED CONSENT

Written consent was obtained from all participants after informing them of the study's purpose, voluntary nature, and their right to withdraw at any time. Confidentiality, anonymity, and privacy were strictly maintained, with data used solely for academic purposes.

ETHICAL APPROVAL

The researchers secured Institutional Review Board approval from Christ Deemed to be University prior to initiating the study. This ethical clearance affirmed the study's compliance with established research standards. It ensured the protection of participants' rights, safety, and overall well-being throughout the research process.

DATA AVAILABILITY

The researchers ensured academic integrity by properly citing all sources, allowing readers to access the originals through the reference list. Derived data supporting the findings of this study are available from the corresponding author [NV] upon request.

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