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Effectiveness of E-Learning in Enhancing Student Learning Outcomes and Academic Performance

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ABSTRACT

Education is fundamental to a nation's progress because it fosters tolerance and intellectual growth among its citizens. One of the new tools, e-learning allows any school to teach its pupils using the internet and other contemporary technologies. Improving learning outcomes and academic performance via online learning is the focus of this project. How online instructional activities, multimedia materials, adaptive learning technologies, and digital learning platforms may boost student engagement, comprehension, knowledge retention, and performance in the classroom is the main emphasis. Digital literacy, critical thinking, teamwork, communication, and the ability to learn independently are all areas that e-learning may help students improve, according to the research. Learner motivation, self-regulation, instructional design quality, classroom engagement, technology accessibility, and institutional support are some of the aspects that impact the efficacy of online learning. The research adds credence to the idea that online education has the ability to meet the demands of a wide range of students by creating more individualised lessons and making them more accessible.

Keywords: *E-Learning, Student, Learning Outcomes, Academic Performance, Student Engagement, Classroom.*

I. INTRODUCTION

Digital education, also known as E-learning or remote learning, is fundamentally a web-based platform that provides students with access to knowledge or information at any time, irrespective of their geographical location or temporal limitations. This kind of education has existed for some time, originating in the late 1990s and growing rapidly. It has been regarded as an excellent option, especially for mature students.

Digital learning fosters a learner-centric methodology, in which students are anticipated to engage actively in their educational journey. The technological instruments used in virtual education include interactive components, computers, mobile gadgets, the internet, and many equipment that facilitate the acquisition and dissemination of information among students. Various forms of online education are available, including microlearning, personalised learning, synchronous, asynchronous, blended, and massive open online courses. Digital education provides several benefits to learners, including its customisation to personal requirements, convenience, and flexibility regarding participation. Students may engage in their online courses from any convenient location using accessible online learning software on their personal computers (PCs) or laptops, allowing for reduced time and geographical constraints for certain courses.



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The challenges of online education include the learning experiences and academic achievements of students. Moreover, although technology enhances the accessibility and user-friendliness of online learning platforms, it can also impose limitations, as numerous students encounter difficulties in obtaining internet access, subsequently leading to challenges in participation and attendance in virtual classes, complicating the adoption of online learning platforms. Additional challenges associated with e-learning include educational policy, pedagogical approaches, accessibility, cost-effectiveness, and adaptability. Numerous developing nations have significant challenges with dependable internet connectivity and access to digital gadgets, particularly among economically disadvantaged youth. Sustaining student involvement in a virtual classroom may be more challenging than in a conventional in-person environment. Despite the many benefits of online education, there is less engagement between learners and instructors. A further obstacle to online education is the absence of avenues for interpersonal interaction, seen crucial for fostering peer support and facilitating comprehensive group dialogues on the topic.

In the last four years, COVID-19 has proliferated globally, necessitating the closure of schools, which prompted instructors and students at all levels to rapidly transition to online learning to mitigate the virus's transmission while maintaining educational continuity. The onset of the epidemic made conventional in-person teaching and training approaches impractical. Although face-to-face (F2F) and online learning have many similarities, they also exhibit notable differences; among the commonalities are requirements for students such as attendance, understanding of the material, submission of assignments, and fulfilment of collaborative projects. Educators must still develop curriculum, improve instructional quality, address student enquiries, motivate learners, and evaluate assignments. A distinction between online education and face-to-face instruction is that online learning prioritises student engagement and requires active participation, while face-to-face learning is instructor-focused and involves passive involvement from the learner. A further distinction is that in-person education necessitates simultaneous teaching and learning at the same venue, but online education is not confined by temporal or spatial limitations. Digital education facilitates the independent execution of instruction and acquisition of knowledge using internet-based information dissemination platforms.

Identifying more effective methods to enhance student involvement in virtual learning environments is essential, given that the lack of face-to-face interactions between students and educators or among peers remains a considerable challenge in online education. Student engagement is defined by the level of involvement or interest students demonstrate in their education and their connections to their classrooms, institutions, and peers. Engagement is seen as a significant factor influencing the depth and quality of students' learning, correlating with enhancements in their academic performance, retention rates, and both personal and cognitive growth. In a digital environment, student involvement is vital for their achievement and effectiveness.

The alteration in educational delivery methods prompts questions about the viability of online learning as a substitute for conventional classroom teaching, with a meticulous examination of cost-benefit analysis, student experience, and academic performance currently taking place. This decision-making process is expected to persist as students pursue enhanced educational prospects and technology innovations. A



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person's scholarly performance is crucial to their success within an educational setting; students' academic success serves as a measure of their educational attainment. Nonetheless, it is often observed that while students' learning abilities are moderate, the expectations for their academic performance are increasing. This explains why the student's academic achievement rate is substandard.

II. REVIEW OF LITERATURE

Gupta, Shweta et al., (2024). The objective of this study was to examine the responses of undergraduate and graduate students at Banaras Hindu University (BHU), India, to online learning options concerning creativity, e-learning efficacy, and academic achievement. A cross-sectional survey methodology was used to gather data from 480 students. The study suggests that educators should promote the regular use of e-learning platforms to enhance academic performance. Learners must to exercise caution in over-dependence on these platforms, as it may stifle their creativity. There is little investigation into the impact of online education on students' creativity and classroom performance, and this study addresses that need. It offers insights that might be beneficial for students and educators that use e-learning systems.

Lau, Likching. (2023) Classrooms in the twenty-first century have seen a marked increase in the use of technology. This led to the development of online learning, which is now the norm in most schools. The reasons for the adoption and its effect on students' learning outcomes have been the primary foci of previous research into the reasons for this e-learning boom. In order to assess the impact of technology on education and the motivations behind its usage by both students and teachers, this research examined the relationship between technology and inquiry-based learning. Finally, student involvement, real performance, and overall pleasure were utilised to evaluate the effectiveness of online education. Online education is beneficial for students' test results since there is a positive association between students' usage of technology in class and their scores.

Nasiatin, Titin et al., (2023). Electronic learning, or e-learning, is the practice of acquiring knowledge and skills over the World Wide Web, which allows for a more adaptable and individualised approach to education. It is a novel approach to delivering high-quality educational services using electronic means, with the goal of improving students' knowledge, abilities, and consistency. Colleges and institutions throughout the globe are increasingly using various forms of online education. The flip side is that e-learning has made it possible to actively improve one's learning abilities, knowledge, and performance. In essence, this study was a literature review in and of itself. Research publications covering the years 2018–2023, culled from databases such as Science Direct, PubMed, and Google Scholar, make up the subject. We utilised the PRISMA framework to analyse the literature review thoroughly. Only ten of the one hundred and thirty-three papers that were considered suitable for analysis survived the rigorous examination of fourteen relevant journals. A growing body of research suggests that students may benefit from an online education in rethinking the basics of effective teaching methods. According to the findings of the literature study, the e-learning paradigm influences the concurrent learning pleasure. How content students are with their online education as a whole may be a good measure of the quality of higher education.



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Kumar N, Keerthi et al., (2022). Online education is one of the most contentious topics in the field of global education today. There are those who believe that traditional classroom instruction is still the best option, and some who believe that online learning is no better. Online courses have quickly become an integral part of university curriculum throughout the globe as the COVID-19 pandemic has progressed. The initial topic of whether online education enhances students' academic achievements is revisited in this research. The three factors used for this aim are technical competency, e-learning standards, and e-learning infrastructure. According to a survey of the research on the topic, students' performance in a range of subjects might be enhanced by online education. It was concluded, however, that such excellent performance requires both a high degree of technical competence and e-learning materials of adequate quality. There is inconsistency in the results of two studies; one says that infrastructure is not important for improved performance, while the other says it is essential for greater academic achievement. When implemented correctly, e-learning has the potential to boost students' academic achievement, according to the study's findings.

M, Monicka & Jaganathan, Jayachithra. (2021). The present study aims to investigate how high school science courses might be enhanced via online education. The study's sample consisted of 67 ninth graders hailing from the Sivagangai area in Tamil Nadu. The experimental design used by the researcher had two groups: one controlling for conventional methods and the other testing the efficacy of E-Learning. Final grades are the dependent variable, whereas online education is the independent variable. The experimental group of students got online instructional videos, e-content, quizzes, etc. after 36 days of therapy, whilst the control group continued to receive traditional classroom training. The experimental group of students first completed a pre-test to see where they were in terms of knowledge before receiving therapy. To examine the data, we used SPSS. The results of the pre- and post-tests for the experimental group were shown to vary significantly. The e-learning experimental group outperformed the conventional treatment group in terms of student achievement.

Saputra, Ari & Hidayani, Hidayani. (2021). The primary objective of this research was to determine how e-learning influences students' academic performance. The study used a quantitative approach with a pre- and post-test methodology. After tallying up all of the students in the population, a total of 43 were included in the sample. The research's sample was administered a pre- and post-test to collect data. Students' English ability was tested using a F test to determine the impact of the online learning technique. The results show that the usage of e-learning techniques has an effect on students' English proficiency. When researchers utilised Tukey's HSD continuation test, they discovered that participants' average scores on both the pre- and post-tests improved. A study was suggested that would combine online learning techniques with different forms of media, including the Zoom app or Microsoft Teams.

Lumadi, Mutendwahothe. (2013). The purpose of this study was to examine whether or not prospective teachers' academic performance improved after participating in online courses. The researchers' interest in e-Learning is justified by the necessity for an instructional approach that may help educational institutions solve their issues and achieve better outcomes. They conducted an experiment to see if traditional classroom education or e-Learning (blended learning) was more effective in preparing prospective teachers for the profession. The results provide new evidence that e-Learning considerably



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affects student performance as student-teachers trained via eLearning regularly outperformed the traditional approach. Given the increasing complexity of educational challenges, this study lends credence to the notion that training institutions should use ICTs and utilise dynamic and multi-dimensional learning methodologies to adapt to changing situations.

III. EFFICACY OF E-LEARNING ON STUDENTS

To enhance the educational experience, smart classrooms use an array of technologies, including interactive whiteboards, digital projectors, tablets, and artificial intelligence-based instructional software. The shift in educational approach has had considerable effects on learners:

The use of smart classrooms has altered the educational landscape by promoting heightened student involvement, boosting academic success, and aiding in the attainment of core competencies. Despite this, it is essential for educators and policymakers to tackle the issues of accessibility and justice to optimise the many benefits.

Enhanced Engagement and Motivation

Intelligent classrooms may enhance the educational experience by making it more engaging, captivating, and pleasurable for learners. In contrast to conventional pedagogical approaches, when learners often attend lectures and jot down notes, technology-enhanced classrooms provide avenues for active engagement in educational activities. The use of multimedia presentations, instructional films, interactive simulations, gamification, and live quizzes may enhance course engagement and comprehension. These endeavours may engage students' attention, stimulate inquisitiveness, and inspire them to participate more energetically in the classroom. As learners engage more deeply in their educational journey, they may cultivate heightened enthusiasm for their disciplines and a more favourable disposition toward acquiring knowledge.

Personalized Learning Experiences

Students' needs, talents, and learning paces may be met via personalised learning experiences in smart classrooms. Students in a technology-supported learning environment are able to study at their own pace and in their own unique manner, as opposed to the more conventional classroom setting. In order to help students succeed, adaptive learning technology may analyse their individual learning styles and then tailor their lessons to each student's specific needs. Meanwhile, pupils who grasp ideas easily may delve into more complex subjects and more demanding tasks. Because of this adaptability, children may overcome learning challenges, gain self-assurance in their abilities, and be more accountable for their own education.

Improved Academic Performance

When teachers know how to utilise technology in the classroom, it may help pupils do better in school. Educational films, cartoons, interactive presentations, simulations, and online practice exercises are all examples of digital learning tools that help simplify and solidify difficult ideas. Students can maintain attention and memory retention with the use of visual and interactive material. Students also have the option to study at their own speed, review previously covered material, and practice challenging concepts via the use of digital tools. Consequently, students may benefit from technology's ability to enhance their grasp of topics and achieve higher academic achievements when it is carefully combined with suitable teaching techniques.



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Development of 21st-Century Skills

Intelligent classrooms are crucial in equipping pupils to fulfil the requirements of a more digital and technology-oriented society. Consistent engagement with digital tools and educational platforms enhances students' digital literacy and fosters more confidence in information access, evaluation, and utilisation. Technology-driven educational tasks may foster critical analysis, innovation, interpersonal communication, teamwork, and problem-solving abilities. Cloud-based systems enable students to collaborate on projects, exchange ideas, engage in discussions about challenges, and accomplish tasks collectively. These experiences enhance academic knowledge while also equipping students with essential skills beneficial for further education, career opportunities, and daily living.

Increased Accessibility for Diverse Learners

Intelligent classroom technology can enhance educational accessibility and inclusivity for students with diverse learning requirements and backgrounds. Digital instruments often provide beneficial functionalities like screen readers, captions, audio resources, customisable text, and translation options, which may assist learners with impairments or linguistic challenges. Documented lectures and electronic educational resources enable students to review classes anytime they want more assistance. This adaptability enables learners to progress at their own speed and engage more confidently in academic pursuits. Consequently, the judicious use of technology may foster a more conducive educational environment in which students with diverse capabilities and learning styles are afforded greater opportunities for success.

IV. IMPACT ON STUDENTS' LEARNING OUTCOMES

A research article in the Journal of Educational Technology & Society revealed that learners in smart classrooms exhibited a 25% enhancement in educational results relative to their counterparts in conventional classes. The use of multimedia resources and interactive instruments aids learners in comprehending and remembering intricate ideas.

Enhanced Retention and Understanding

Students in smart classrooms are 55 percent more engaged than those in conventional classes, according to research out of Harvard University's Graduate School of Education. Because smart technologies are interactive, they encourage active learning and involvement, which in turn increases engagement.

Personalized Learning and Academic Performance

One common application of technology in "smart" classrooms is the creation of individualised lesson plans for students. That tailor's instructional material to particular student requirements. When it comes to students who have difficulty with more conventional forms of instruction, a study by McKinsey & Company found that personalised learning systems might boost their performance by as much as 30%.

Improvement in Test Scores

Students utilising smart classroom technology outperformed their conventional classroom counterparts by 20% on standardised examinations, according to research published in the International Journal of Emerging Technologies in Learning.



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Development of 21st-Century Skills (Digital Literacy)

Critical digital literacy abilities may be developed by pupils via exposure to digital technologies in smart classrooms. One of the most important talents for the workforce of the future is digital literacy, according to the World Economic Forum. Smart classrooms are ideal for teaching students these abilities at a young age.

Collaboration and Communication

With the use of digital platforms that allow group work, conversations, and peer evaluations, smart classrooms improve teamwork. Students' capacity to work well in teams increases by 40% in smart classrooms, according to a research published in the Journal of Computer Assisted Learning. This is because students in these classes are more inclined to participate in collaborative learning.

Teacher Effectiveness and Classroom Management (Improved Instructional Quality)

Smart classroom instructors report a 30% improvement in their ability to offer effective education, according to study by the Bill & Melinda Gates Foundation. The use of smart technology enables educators to employ a range of pedagogical approaches, including blended learning and flipped classes that address various learning styles.

Efficient Classroom Management

Because smart classrooms employ interactive technologies to keep students interested and minimise distractions, a research from UCLA revealed that classroom management concerns are reduced by 15%.

Cost and Accessibility

Smart classroom technology may require a large upfront investment, but studies conducted by EdTech Magazine reveal that schools may save money in the long run by cutting down on textbook prices, printing expenditures, and inefficient use of school resources.

Accessibility for Diverse Learners:

Features like as screen readers, captioned films, and customisable interfaces make smart classrooms more accessible for students with impairments. Students with learning impairments gain a lot from smart classroom technology, according to the National Center for Learning impairments. These tools provide individualised help and resources.

V. E-LEARNING AND STUDENT PERFORMANCE

The ongoing digitisation has led to transformations in the educational framework, including the substitution of traditional in-person instruction with an online system. Although e-learning is a more succinct concept, it is often termed self-directed education. This arises from the first perception of it as a network providing emotional support for autonomous learning. One major rationale for the designation of e-learning as distinct training is due to this. Students were provided with electronic interactive teaching materials (EITMs) that could be operated via their mobile devices. These resources were distributed to students.



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The Internet, whose devices have mostly served as the main catalyst for e-learning, is the principal channel via which e-learning is disseminated. E-learning is used to provide instruction, training, and cooperation via various electronic platforms. E-learning influences students' comprehension of diverse ideas, their critical thinking skills, and other elements. Regarding the conceptual and institutional implications for e-learning in primary education, a relationship was seen between self-efficacy, the quality of the e-learning experience, and the satisfaction levels of e-learning users. E-learning serves as a credible measure of the efficacy of educational environments for online learning, since it significantly influences the motivation to achieve objectives. E-learning serves as a platform that facilitates individuals in attaining their objectives. The establishment of efficient e-learning procedures might significantly impact students' engagement in this educational format.

Programs for students' self-direction have to be established to enhance the quality of education received via e-learning. Self-directed learning is a vital element of effective education, and it is essential that such initiatives get reinforcement. Methods like self-management training and self-regulation exemplify strategies that may be used to improve the efficacy of these programs. In summary, one can ascertain that students possess a positive disposition toward e-activities, which significantly enhance their overall academic experience. This provides an answer to the research inquiry, and it is plausible to infer that participation in academic e-activities results in enhanced enjoyment from the experience. The kids' perspectives were significantly shaped by the e-learning system used at the school rather than by the traits linked to their origins. Although it is well acknowledged that traditional "in-person" education has several difficulties, e-learning offers numerous advantages. E-learning may potentially be pivotal in addressing the challenge of teaching a substantial portion of the populace in countries with considerable historical importance.

Numerous investigations have shown that the cultural backgrounds of students participating in online courses may influence their academic success. The present cohort of students is referred to as "digital natives. This appellation originates from their upbringing in a technological environment, resulting in their evident proficiency and comfort with digital tools. Apprehensions persist over the extent of students' readiness for the online learning settings used in educational establishments. Notwithstanding this, the institution today widely acknowledges it due to the swift technological expansion and the progress made inside educational establishments. This revolution was further enhanced by the advancement of personal computers. As time has progressed and our dependence on mobile devices like smartphones, tablets, and similar products has grown, educators have seen the need of incorporating these tools into the teaching process. The substitution of printed educational materials such as books with electronic instructional resources like optical discs and USB devices is becoming prevalent. Information may also be disseminated using the Internet, which is available at all times and from any location with internet connectivity.

Scholars in education and educational technology have expressed a desire to investigate the relationship between students' academic performance and their adoption of e-learning. Research has shown that e-learning may positively influence students' academic achievement. E-learning has shown the capacity to provide improved educational results and superior academic success relative to traditional classroom environments, contingent upon its proper design and implementation.



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The calibre of the instructional design, the degree of learner involvement, the extent of interaction with peers and instructors, the technological framework, and the accessibility of support resources are factors that are taken into account. It is crucial to consider that the relationship between the acceptability of e-learning and academic success may be affected by personal attributes of students. The involvement of students in e-learning may be affected by several aspects, such as their prior knowledge, preferred learning methods, extent of self-regulation, and motivation levels. This, thus, may influence the pupils' scholarly performance.

Employing effective educational strategies in online learning may enhance students' academic achievement. These approaches include cooperative learning, problem-solving exercises, and formative evaluations. These approaches aim to enhance profound understanding and the preservation of knowledge. The setting in which students participate in e-learning might influence their academic achievement. The effectiveness of e-learning and its correlation with academic success may be affected by several variables, such as the level of institutional backing, resource accessibility, and cultural considerations.

VI. CONCLUSION

Students that are more comfortable with technology are better able to adjust and succeed academically. Personal characteristics like drive, ability to self-regulate, and preferred methods of learning also have a role in how well an individual does in an online classroom. Personalised e-learning techniques are necessary due to differences in learning preferences, which are accompanied by high engagement and excellent time management, both of which are substantially linked to higher academic achievements. Engaged female students may succeed in technology-intensive classes, according to the research. In sum, e-learning platforms supplement conventional classroom instruction, widen participation, and encourage independent study. The results show that in order to get the most out of education, you need good instructional design and students who are prepared to learn. Improved comprehension, longer-term memory retention, and overall efficacy of learning are all outcomes of digital interaction.

REFERENCES

1. Anand, R., & Gupta, N. (2023). Impact of online learning on student engagement and academic performance. *Praxis International Journal of Social Science and Literature*, 6(2), 29–40.
2. Brugliera, P. (2024). The effectiveness of digital learning platforms in enhancing student engagement and academic performance. *Journal of Education, Humanities, and Social Research*, 1(2), 26–36.
3. Gupta, S., Pandey, S., Sahoo, S., & Pandey, C. (2024). E-learning's influence on academic performance, learning outcomes and creativity. *The International Journal of Information and Learning Technology*, 41.
4. Jayaron Jose, B., & Jose, J. (2022). Impact of e-learning on learning outcomes among higher education students: An integrated review. *Scholars Journal of Engineering and Technology*, 10(2), 141–145.
5. Kumar, N. K., Garg, S., N. S., V., & Tongkachok, K. (2022). Effect of e-learning on the academic achievement of students. *ECS Transactions*, 107, 9957–9966.



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Science, Humanities and Management (NCSDESHM – 2025)

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6. Lau, L. (2023). A study of the effects of e-learning on the learning effectiveness of students. *Journal of Education, Humanities and Social Sciences*, 8, 1961–1968.
7. Lumadi, M. (2013). E-learning's impact on the academic performance of student-teachers: A curriculum lens. *Mediterranean Journal of Social Sciences*, 695–703.
8. M., M., & Jaganathan, J. (2021). Effectiveness of e-learning to enhance academic performance of high school students. *Asian Journal of Multidisciplinary Studies*, 10(8).
9. Nasiatin, T., Sansuwito, T., & Dioso, R., III. (2023). Effectiveness of e-learning to student learning satisfaction: A literature review. *International Journal of Health Sciences*, 1(4), 772–787.
10. Olusegun, A., Uranta, E., Ukhurebor, K., Jokthan, G., & Nalwadda, D. (2023). Appraisal of e-learning and students' academic performance: A perspective from secondary schools. *Cypriot Journal of Educational Sciences*, 18(2), 351–367.
11. Saputra, A., & Hidayani, H. (2021). The impact of e-learning on students' academic achievement in English. *ALSYS*, 1, 124–137.
12. Singh, D., & Mishra, S. (2020). Role of e-learning education and e-resources: Its impact on academic performance of the students. *Aegaeum*, 8(2), 1401–1420.
13. Somayeh, M., Dehghani, M., Mozaffari, F., Ghasemnegad, S. M., Hakimi, H., & Samaneh, B. (2016). The effectiveness of e-learning in learning: A review of the literature. *International Journal of Medical Research & Health Sciences*, 5(2), 86–91.
14. Tusevljak, M., et al. (2016). E-learning in higher education: Focus groups and survey among students in Central Europe. *i-manager's Journal of Educational Technology*, 13(2), 11–20.
15. Uyar, A. (2023). Exploring the students' attitudes towards e-learning at territory level: A focus on Türkiye. *International Journal of Curriculum and Instruction*, 15(2), 1327–1353.
16. Vargas, N., & Tian, X. (2013). E-learning: Much more than a matter of technology. *International Journal of E-Education, E-Business, E-Management and E-Learning*, 3(3), 277–281.
17. Yengin, I., Karahoca, A., & Karahoca, D. (2011). An e-learning success model for instructors' satisfaction in the perspective of interaction and usability outcomes. *Procedia Computer Science*, 3(1), 1396–1403.
18. Zolochetskaya, E., Zubanova, S., Fedorova, N., & Sivakova, Y. (2021). Education policy: The impact of e-learning on academic performance. *E3S Web of Conferences*, 244(2), 11024.