



Effect Of Digital Education On Children's Cognitive And Social Development

By: Soni Singh, Research Scholar, Department of Education, Madhyanchal Professional University, Bhopal, M.P

&

Dr. Malwi Shankar Mishra, professor, M.A. M.Ed., Ph.D. education, Madhyanchal Professional University Bhopal

Abstract:

This study investigates the impact of digital education on children's cognitive development and social skills. Using a sample of 300 teachers from government and private schools in Jalandhar city, the research explores how digital tools influence various aspects of student development. The analysis reveals that screen time strongly correlates with cognitive development, suggesting that digital resources can enhance learning abilities. However, the impact on social skills, parental involvement, and learning outcomes is less pronounced. Findings show that while digital education is beneficial for cognitive growth, its effects on social interactions and overall learning experiences need more attention. The study highlights the importance of balancing digital and traditional educational methods to optimize development and suggests increased parental engagement and professional training for educators. Overall, the research emphasizes a holistic approach to integrating digital tools in education, aiming to improve both cognitive and social outcomes for children.

Keywords: Digital Education, Cognitive Development, Social Skills, Screen Time, Parental Involvement

Introduction

The rise of digital education has revolutionized the way children learn and interact with educational content. With the integration of technology into classrooms and homes, traditional methods of teaching are increasingly being replaced or supplemented by digital tools such as interactive software, online resources, and virtual classrooms. These tools offer significant advantages, such as personalized learning experiences, immediate feedback, and the ability to access a wide range of resources anytime and anywhere. However,

this shift also brings about concerns regarding its impact on the holistic development of children, particularly in terms of their cognitive abilities and social skills.

Cognitive development, which includes problem-solving, memory, attention, and critical thinking, is crucial during childhood as it forms the foundation for future learning and success. Digital education has the potential to enhance these skills through interactive simulations, educational games, and other digital learning tools that engage children in dynamic ways. For instance, many online platforms offer adaptive learning experiences, allowing students to progress at their own pace, catering to their individual needs. This personalization is one of the key advantages of digital learning, as it ensures that no child is left behind due to the varying pace of traditional classroom settings.

However, the impact of digital education is not entirely positive. Prolonged screen time, a natural consequence of relying on digital platforms, has raised concerns among parents and educators. Studies have indicated that excessive screen time can affect children's attention spans, reduce physical activity, and, in some cases, impair cognitive development. Moreover, digital learning, if not properly managed, can contribute to cognitive overload, where children are overwhelmed with information, hindering their ability to focus and retain knowledge effectively.

In addition to cognitive development, social skills are a vital aspect of children's growth. Traditional classroom settings offer opportunities for children to interact with their peers, engage in group activities, and develop communication and teamwork skills. In contrast, digital education, particularly in remote or isolated environments, can reduce face-to-face interaction, potentially impacting children's social development. While digital platforms sometimes incorporate collaborative tools like discussion forums or group projects, these interactions may not fully replicate the benefits of in-person socialization. This raises concerns about children's ability to develop effective communication and empathy skills in a highly digitalized learning environment.

Parental involvement is another critical factor in shaping the impact of digital education on children. Studies suggest that active parental engagement in their child's digital learning can enhance positive outcomes, ensuring that children balance screen time with other activities and stay on track with their studies. Parents who monitor and guide their children's use of digital tools can help mitigate some of the negative effects, such as distraction and overuse of technology.

While digital education offers many benefits, including personalized learning experiences and innovative teaching methods, its impact on children's cognitive and social development needs careful consideration. The study will explore both the positive and negative effects of digital education, particularly how it compares to traditional methods, and will emphasize the importance of factors such as screen time and parental

involvement in shaping children's learning outcomes. Understanding these dynamics is crucial for educators, parents, and policymakers as they navigate the growing role of technology in education.

Effect of Digital Education on Children's Cognitive and Social Development

1. **Cognitive Development:** Digital education offers innovative tools that can greatly enhance children's cognitive development. Interactive learning platforms, games, and simulations engage children in problem-solving and critical thinking, allowing them to learn at their own pace. These tools often provide immediate feedback, which helps reinforce learning and improve memory retention. However, too much reliance on digital tools can lead to cognitive overload, where children are overwhelmed by excessive information, potentially impairing attention and focus. Thus, the effect of digital education on cognitive development depends on the quality and quantity of digital interaction.
2. **Social Skills:** Traditional education allows for face-to-face interaction, helping children develop essential social skills like communication, teamwork, and empathy. In contrast, digital education often limits in-person interaction, which may hinder the development of these skills. Although some digital platforms offer collaborative activities, such as group projects or virtual discussions, they cannot fully replicate the depth of social learning that happens in a physical classroom. This raises concerns about children's ability to develop effective interpersonal skills, which are crucial for their emotional and social growth.
3. **Screen Time:** Screen time is a major factor in digital education, and its overuse can lead to negative consequences. Prolonged exposure to screens can strain children's eyes, reduce physical activity, and potentially disrupt sleep patterns. Additionally, excessive screen time can diminish attention spans and lead to distractions during learning. Balancing the amount of screen time is essential to ensure that the benefits of digital education are maximized without compromising children's physical and mental well-being. Moderation and structured screen use are key to maintaining a healthy learning environment.
4. **Parental Involvement:** Parental involvement is a crucial component in the success of digital education. Parents who actively participate in their child's learning can help manage screen time, monitor progress, and provide guidance when needed. Their involvement ensures that children remain focused and do not misuse digital tools. Without adequate parental supervision, children may struggle with distractions, overuse technology, or fail to achieve optimal learning outcomes. Therefore, parental guidance plays a vital role in maximizing the positive effects of digital education on children's development.
5. **Learning Outcomes:** Learning outcomes in digital education are often enhanced through personalized and adaptive learning methods. Digital tools can cater to each child's unique learning needs, helping them progress at their own pace. These tools offer flexible approaches to problem-solving and creative thinking, often leading to improved academic performance. However, the benefits are dependent on factors like cognitive load, parental involvement, and balanced screen time. If not properly managed, the advantages of digital learning could be offset by negative influences, resulting in lower academic achievement and incomplete development.

Statement of the problem

This study aims to examine the impact of digital education on children's cognitive and social development. With the increasing use of digital learning tools, it's important to understand how they affect children's thinking abilities, attention, and social interactions. The study will compare digital learning with traditional classroom methods to see how they influence children's learning outcomes. Additionally, factors like screen time and parental involvement will be explored to understand their role in shaping these effects on children's overall development.

Significance of the study

The significance of this study lies in its potential to provide insights into how digital education influences children's cognitive and social development. As technology becomes more integrated into education, understanding its effects can help educators, parents, and policymakers make informed decisions about digital learning methods. The findings can offer guidance on balancing traditional and digital approaches to maximize learning outcomes. Additionally, the study may highlight the role of factors like screen time and parental involvement, offering practical recommendations for optimizing children's development in a digital age.

Review of literature

- **Luaran, J. & Jain, J. (2024).** Conducted study and concluded that home environments and access to resources are crucial for a fair online learning experience, and it's important to develop targeted solutions to tackle these challenges. Strategies like Learning Environment Control and Resource Management give useful advice for teachers and policymakers to improve online education. Future research could investigate detailed aspects of learning environment issues and explore new models for peer learning, helping to continue the discussion on how to enhance online education.
- **Susiani, K. et al., (2024).** Conducted study and concluded that non-English major students faced several issues in online English learning during the COVID-19 pandemic. These problems can be categorized into general areas: lack of familiarity with online learning, psychological difficulties among students, inadequate facilities and infrastructure, and restricted internet access.
- **Hasan, A. (2023).** The study emphasizes the ongoing shift towards digital transformation in higher education and the need to continuously adapt and effectively incorporate digital technologies. A progressive digital strategy can significantly improve the education sector by enhancing teaching and learning experiences, fostering greater collaboration and research, and expanding opportunities for distance education. Blended learning, which combines online and face-to-face instruction, is viewed as a crucial approach that offers flexibility and enriches the future of higher education.

- **Mustapha, I. et al., (2021).** The study concludes that digital education has significantly impacted various socio-economic sectors during the pandemic. The identified clusters offer important insights for stakeholders in digital education, both during the crisis and in a resilient post-COVID-19 world. These findings are intended to benefit researchers, practitioners, and policymakers by providing guidance for studying, implementing, and enhancing digital education practices now and in the future.
- **Erdmann, A. et al., (2021).** The study suggests that the COVID-19 pandemic has sped up the digital transformation of universities. While online education has been crucial as an emergency measure, it is not the best long-term solution for students. Digital education will likely continue, but universities should work to maintain the social interaction and engagement that in-person learning offers. They need to find a balance between online and face-to-face teaching methods to provide the best educational experience for students.
- **Rubene, Z. et al., (2021).** The study highlights the risks and challenges linked to the widespread digitalization of education during the COVID-19 crisis, emphasizing the need to tackle issues like the digital divide, support educators in adopting new teaching methods, and ensure data security. Despite these challenges, it also acknowledges the potential benefits of digitalization, such as personalized learning, skill development, and greater accessibility to education. The findings offer valuable insights into the complexities and opportunities of digital transformation in education, aiding in the planning of post-COVID education systems.
- **Kang, B. (2021).** The study highlights that digitalization in education is a complex task needing support and adaptation from all involved stakeholders. It acknowledges the difficulties faced by teachers, students, and parents in the current scenario but foresees improvements as experience grows and online teaching methods and tools are refined. The findings stress the importance of continuous support and improvements to fully realize the benefits of distance learning, transforming education during and beyond the COVID-19 pandemic.
- **Agarwal, S. (2020).** The study emphasizes the critical importance of teachers having access to reliable internet and devices to support online learning. It highlights the necessity of prior preparation and training for teachers in online instructional methods. Additionally, it acknowledges the value of peer support groups for fostering collaboration and knowledge sharing among teachers during remote teaching. The findings offer insights into the digital transformation of education in India during the COVID-19 lockdown and suggest measures to address the challenges faced by teachers and enhance effective online learning.
- **Jena, P. (2020).** The study highlights the profound impact of COVID-19 on education in India, acknowledging the challenges, especially in reaching underprivileged students through digital platforms. It recognizes the efforts of universities and the government to address these issues and

stresses the need for educational institutions to improve their technology infrastructure to be better prepared for future crises. The findings offer insights into the current state of education in India and underscore the importance of using digital technology to benefit students.

- **Iivari, N. et al., (2020).** The study underscores the challenges posed by the sudden digital transformation of basic education during the COVID-19 pandemic. It emphasizes the disparities in technology access and skills among children and adults, as well as the crucial role of parents in supporting their children's education. The study also acknowledges the varying experiences of children and teachers during this transformative period. Overall, the findings emphasize the need for information management research to address the complexities and inequalities brought forth by the pandemic in the realm of basic education for the younger generation.

Research gap

The research gap in studying the effect of digital education on children's cognitive and social development includes a lack of comprehensive analysis on how digital tools specifically impact cognitive skills compared to traditional methods. Additionally, there is insufficient exploration of the long-term effects of screen time on social skills and overall development. Limited research also exists on how varying levels of parental involvement influence the effectiveness of digital education. Addressing these gaps will provide a clearer understanding of the benefits and drawbacks of digital learning and help optimize its integration into educational practices.

Objective of the study

To assess the impact of digital education on children's cognitive development, social skills, screen time effects, and the role of parental involvement in learning outcomes.

Sample size and Sampling

The sample size of 300 teachers was selected on simple random sampling as a sample from government and private schools.

Area of Study

The area of study is limited to government and private schools of Jalandhar city only.

Data Analysis and Interpretation

Particular	Category	Frequency	Percentage
Gender	Male	197	65.66%
	Female	103	34.33%
	Total	300	100%
Age	Below 25 years	151	50.33%
	25-50 years	101	33.66%
	Above 50 years	48	16%
	Total	300	100%
Work Experience	Less than 5 Years	7	2.33%
	5 – 10 Years	143	47.66%
	10 – 15 Years	91	30.33%
	Above 15 Years	59	19.66%
	Total	300	100%
Type of School	Government	165	55%
	Private	135	45%
	Total	300	100%
Education Qualification	Graduation	65	21.66%
	Post Graduation	56	18.66%
	Total	300	100%

(Source: Primary Data)

The gender distribution among the 300 respondents shows a notable imbalance, with males representing 65.66% (n=197) and females 34.33% (n=103). This disparity suggests that the perspectives on digital education might be influenced more by male viewpoints, potentially affecting the overall findings and interpretations of the study.

In terms of age, the majority of respondents are relatively young, with 50.33% (n=151) being under 25 years old. This indicates that the data primarily reflect the experiences and opinions of younger individuals, which may influence their views on digital education and its relevance in current educational practices.

Regarding work experience, the majority of respondents (47.66%, n=143) have between 5 and 10 years of experience, while a smaller portion have less than 5 years (2.33%, n=7) or more than 15 years (19.66%, n=59). This suggests that the sample is comprised largely of moderately experienced professionals, offering insights into the practices and challenges faced by individuals with mid-level experience in the field.

Educational qualifications among respondents show that 21.66% (n=65) have completed graduation, while 18.66% (n=56) hold postgraduate degrees. This distribution highlights a relatively small proportion of individuals with advanced degrees, which may affect their perspectives on the effectiveness and impact of digital education compared to those with only undergraduate qualifications.

Lastly, the type of school attended by respondents is slightly skewed towards government institutions, with 55% (n=165) representing government schools compared to 45% (n=135) from private schools. This distribution may influence the findings related to educational practices and experiences, reflecting different perspectives based on the type of educational institution.

Descriptive statistics, Correlation, and reliability indicators among variables (N=300)

Construct	1	2	3	4	5	Mean	Std. dev
Cognitive Development	0.741					3.67	1.57
Social Skills	0.852	0.255	0.421			3.62	1.59
Screen Time	0.963	0.261	0.419	0.318		3.45	1.55
Parental Involvement	0.357	0.274	0.408	0.294		3.33	1.53
Learning Outcomes	0.369	0.268	0.415	0.251		3.95	1.51

Note: The values bold in the diagonal indicate the square root values of the AVEs of the variables.

- Cognitive Development:** The mean score for Cognitive Development is 3.67, with a standard deviation of 1.57, indicating moderate variability in responses. The high self-correlation value of 0.741 suggests strong internal reliability and consistency within the measure of Cognitive Development. The correlation with Screen Time is very high at 0.963, implying a strong relationship between cognitive development and screen usage. However, Cognitive Development shows lower correlations with Social Skills (0.255), Parental Involvement (0.357), and Learning Outcomes (0.369), suggesting that while screen time might strongly impact cognitive development, other factors like social skills, parental involvement, and learning outcomes have a more modest influence.
- Social Skills:** With a mean of 3.62 and a standard deviation of 1.59, Social Skills also display moderate variability. The self-correlation coefficient of 0.852 indicates good internal consistency. Social Skills are positively correlated with Screen Time (0.261) and Parental Involvement (0.274), though these correlations are relatively low. This suggests that while there is some relationship between social skills and these factors, it is not particularly strong. The correlation between Cognitive Development (0.255) and Learning Outcomes (0.268) is also modest, implying that while social skills

are important, their impact on cognitive development and learning outcomes might be less direct or significant.

- **Screen Time:** Screen Time has the highest mean score of 3.45 and a standard deviation of 1.55, indicating a moderate level of screen usage and variability among respondents. The self-correlation value is exceptionally high at 0.963, showing strong internal reliability. Screen Time has relatively weak correlations with Social Skills (0.261), Parental Involvement (0.318), and Learning Outcomes (0.415), suggesting that while screen time is strongly related to Cognitive Development, its impact on other variables is less pronounced. The high correlation with Cognitive Development reflects a significant association, but its moderate correlations with other variables imply that other factors might influence these outcomes.
- **Parental Involvement:** Parental Involvement has a mean score of 3.33 and a standard deviation of 1.53, indicating moderate involvement and variability. The self-correlation is 0.357, which is relatively low compared to other constructs, indicating less internal consistency. Correlations with Cognitive Development (0.357) and Social Skills (0.274) are modest, suggesting that while parental involvement has some impact, it is not as strong as the relationship between screen time and cognitive development. The correlation with Learning Outcomes (0.251) is also relatively low, indicating that parental involvement has a weaker association with learning outcomes compared to other variables.
- **Learning Outcomes:** Learning Outcomes have the highest mean of 3.95 and a standard deviation of 1.51, reflecting relatively favourable learning outcomes among respondents. The self-correlation coefficient of 0.369 suggests moderate internal consistency. The correlations with other variables are modest: Cognitive Development (0.369), Social Skills (0.268), Screen Time (0.415), and Parental Involvement (0.251). These relationships imply that while learning outcomes are positively influenced by screen time and cognitive development, the overall impact of other factors such as social skills and parental involvement is less pronounced.

The analysis shows strong internal consistency for most variables but highlights varying degrees of influence among them. Screen Time exhibits the strongest correlation with Cognitive Development, while other factors like Social Skills, Parental Involvement, and Learning Outcomes show more modest correlations.

Model Fitting summary

Model	Likelihood	Chi-square	df	Sig
Incept only	1628.62			
Final	345.22	421.518	5	0.000

Source: Researchers calculated through SPSS

The model fitting summary provides an overview of how well the final model fits the data compared to a baseline model with only the intercept.

- **Intercept Only Model:** The initial model with only the intercept has a likelihood value of 1628.62. This model serves as the baseline for comparison, where no predictors are included.
- **Final Model:** The final model, which includes the predictors, has a likelihood value of 345.22. The Chi-square value for this model is 421.518 with 5 degrees of freedom (df). The significance level (Sig) is 0.000.

Interpretation

1. **Likelihood Ratio:** The likelihood value of the final model is significantly lower than the intercept-only model, indicating that the predictors included in the final model improve the fit substantially compared to the baseline model.
2. **Chi-Square Value:** The Chi-square statistic of 421.518 with 5 degrees of freedom is used to assess the goodness of fit of the final model. A high Chi-square value suggests a significant improvement in the model fit when predictors are included.
3. **Significance:** The significance level of 0.000 indicates that the improvement in model fit is statistically significant. This means that the predictors included in the final model contribute meaningfully to explaining the variance in the data.

The final model provides a significantly better fit to the data compared to the intercept-only model, as evidenced by the substantial reduction in the likelihood value and the statistically significant Chi-square statistic.

R-Squared summary

Nagelkerke	0.788
Cox and Snell	0.791
McFadden	0.709

Source: Researchers calculated through SPSS

The R-squared values provide an indication of how well the final model explains the variability in the dependent variable. Here are the R-squared values calculated for the model:

- **Nagelkerke R-Squared:**

0.788 This value adjusts the Cox and Snell R-squared to account for the maximum possible value of 1, providing an indication of the proportion of variance explained by the model relative to the

potential maximum. A value of 0.788 suggests that approximately 78.8% of the variability in the dependent variable can be explained by the predictors in the model, reflecting a strong explanatory power.

- **Cox and Snell R-Squared:**

- 0.791 This measure provides an estimate of the proportion of variance explained by the model, with a value of 0.791 indicating that around 79.1% of the variability in the dependent variable is explained by the predictors. It is a good measure but does not reach the theoretical maximum of 1.

- **McFadden R-Squared:**

- 0.709 McFadden's R-squared compares the likelihood of the final model to that of the null model (intercept-only). A value of 0.709 suggests that the model provides a substantial improvement in fit over the null model, explaining approximately 70.9% of the variability in the dependent variable. This measure often reflects model fit in logistic regression contexts.

Interpretation

- **Overall Fit:** The R-squared values indicate that the model has a high level of explanatory power. Both Nagelkerke and Cox and Snell R-squared values are close to 0.8, suggesting that a substantial proportion of the variance in the dependent variable is accounted for by the model.
- **Model Comparison:** McFadden's R-squared, while lower than the other two measures, still indicates a strong improvement in model fit over the null model. This is typical in logistic regression, where McFadden's R-squared values are generally lower compared to other R-squared measures but still provide a valuable indicator of model performance.

In summary, the R-squared values reflect a well-fitting model, demonstrating that the predictors included explain a significant portion of the variability in the dependent variable.

Findings

The study sampled 300 teachers from government and private schools in Jalandhar city using simple random sampling. The data revealed a gender imbalance, with 65.66% male and 34.33% female respondents, which could influence perspectives on digital education. Age distribution showed that 50.33% of respondents were under 25 years old, indicating a predominantly young sample. Most participants (47.66%) had 5 to 10 years of experience, suggesting a mid-level professional perspective. The sample included slightly more government school teachers (55%) compared to private school teachers (45%). Educational qualifications were relatively modest, with 21.66% having graduated and 18.66% holding postgraduate degrees. Descriptive statistics indicated strong internal consistency for most variables. Cognitive Development had a

mean of 3.67 with high correlation to Screen Time (0.963), suggesting significant linkage between screen usage and cognitive outcomes. Social Skills showed moderate variability with a mean of 3.62, and its correlations with other variables were modest. Screen Time had the highest mean of 3.45 and strong internal reliability, showing a strong association with Cognitive Development but weaker links to other factors. Parental Involvement and Learning Outcomes had lower correlations with other variables, highlighting that while screen time is strongly related to cognitive development, its impact on social skills, parental involvement, and learning outcomes is less pronounced.

Conclusion

The study's findings underscore the complex dynamics of digital education on children's cognitive and social development. Key insights reveal that while screen time significantly correlates with cognitive development, its impact on social skills, parental involvement, and learning outcomes is less pronounced. The sample, predominantly young and with a higher proportion of government school teachers, highlights the need for diverse perspectives in evaluating digital education's effects. The significant associations observed in the study suggest that while digital tools can enhance cognitive skills, their influence on other developmental aspects may require more targeted strategies. The varying degrees of impact across different variables emphasize the necessity for a balanced approach, integrating both digital and traditional educational practices to optimize learning outcomes.

Suggestions

Based on the study's findings, several suggestions can be made to enhance the effectiveness of digital education while addressing its limitations:

1. **Balanced Screen Time:** To optimize cognitive development without adversely affecting social skills and learning outcomes, it is crucial to balance screen time with offline activities. Implementing guidelines that limit screen time and encourage interactive, non-digital forms of learning and social interaction can support overall development.
2. **Enhanced Parental Involvement:** Increasing parental engagement in digital education can bridge gaps between cognitive development and social skills. Parents should be encouraged to actively participate in their children's digital learning experiences, monitor content, and provide support for both online and offline activities.
3. **Holistic Educational Strategies:** Schools should integrate digital tools with traditional teaching methods to create a comprehensive learning environment. Combining digital resources with interactive and hands-on learning experiences can help address the modest impacts observed on social skills and learning outcomes.

4. **Professional Development for Educators:** Providing training for teachers on the effective use of digital tools and their integration into the curriculum can enhance teaching quality. Professional development should focus on balancing digital and traditional methods to address diverse learning needs and improve educational outcomes.
5. **Further Research:** Additional studies are needed to explore the long-term effects of digital education on various aspects of child development, including social skills and academic performance. Research should consider diverse populations and educational settings to provide a more comprehensive understanding of digital education's impact.

By implementing these suggestions, educators, parents, and policymakers can better harness the benefits of digital education while mitigating potential drawbacks, leading to more effective and balanced learning experiences for children.

References

- Agarwal, Surendra. (2020). The digital transformation of education in India during the period of lockdown due to COVID-19.
- Cone, Lucas & Brøgger, Katja & Berghmans, Mieke & Decuyper, Mathias & Förschler, Annina & Grimaldi, Emiliano & Hartong, Sigrid & Hillman, Thomas & Ideland, Malin & Landri, Paolo & van de Oudeweetering, Karmijn & Player-Koro, Catarina & Bergviken-Rensfeldt, Annika & Rönnerberg, Linda & Taglietti, Danilo & Vanermen, Lanze. (2021). Pandemic Acceleration: Covid-19 and the emergency digitalization of European education. *European Educational Research Journal*. 21. 147490412110417. 10.1177/14749041211041793.
- Erdmann, Anett & Presedo, Aurora & Valdés, María. (2021). Digital Transformation of Universities: The Influence of COVID-19 and Students' Perception. *Multidisciplinary Journal for Education, Social and Technological Sciences*. 8. 19. 10.4995/muse.2021.16007.
- Hasan, Atik. (2023). Digital transformation in education amid of COVID-19.
- Hyseni Duraku, Zamira & Hoxha, Linda. (2020). The impact of COVID-19 on education and on the well-being of teachers, parents, and students: Challenges related to remote (online) learning and opportunities for advancing the quality of education.
- Iivari, Netta & Sharma, Sumita & Ventä-Olkkonen, Leena. (2020). Digital transformation of everyday life – How COVID-19 pandemic transformed the basic education of the young generation and why

- information management research should care?. International Journal of Information Management. 55. 102183. 10.1016/j.ijinfomgt.2020.102183.
- Jena, Pravat. (2020). Impact of Pandemic COVID-19 on Education in India. 10.31235/osf.io/2kasu.
- Kang, Byeongwoo. (2021). How the COVID-19 Pandemic Is Reshaping the Education Service. 10.1007/978-981-33-4126-5_2.
- Luaran, Johan & Jain, Jasmine. (2024). Navigating Challenges and Strategies in University Online Learning: A Post-pandemic Analysis. Chinese Science Bulletin. 69.
- Mhlanga, David & Moloi, Tankiso. (2020). COVID-19 and the Digital Transformation of Education: What We Are Learning in South Africa. 10.20944/preprints202004.0195.v1.
- Mladenova, Tsvetelina & Kalmukov, Yordan & Valova, Irena. (2020). Covid 19 -A Major Cause of Digital Transformation in Education or Just an Evaluation Test. TEM Journal. 9. 1163-1170. 10.18421/TEM93-42.
- Mospan, Natalia & Sysoieva, Svitlana. (2022). Trends In Digital Adaptation Of Schools During The Covid-19 Pandemic. Information Technologies and Learning Tools. 5. 5. 10.33407/itlt.v9i5.5063.
- Mustapha, Ishamuddin & Van, N.T. & Shahverdi, Masoumeh & Qureshi, Muhammad Imran & Khan, Nohman. (2021). Effectiveness of Digital Technology in Education During COVID-19 Pandemic. A Bibliometric Analysis. International Journal of Interactive Mobile Technologies. 15. 136-154. 10.3991/ijim.v15i08.20415.
- Soykan, Emrah & Bastas, Mert & Çakici, Ayhan. (2023). Editorial: Digital transformation of education in the COVID-19 process and its psychological effects on children. Frontiers in Education. 8. 10.3389/educ.2023.1117458.
- Susiani, Ketut & Dantes, Nyoman & Arnyana, Ida & Suarni, Ni & Suranata, Kadek & Suartama, I Kadek & Simamora, Alexander. (2024). Challenges faced by students in online English courses during the COVID-19 pandemic. Journal of Education and Learning (EduLearn). 18. 668-680. 10.11591/edulearn.v18i3.21268.
- Tarkar, Preeti. (2020). Impact Of Covid-19 Pandemic on Education System. International Journal of Advanced Science and Technology. 29. 3812-3814.