

## The Influence of Character Education on Elementary School Students' Social Behavior

Muhammad Sabir <sup>1</sup>, Harianta Sembiring <sup>2</sup>, Ahmad Yani <sup>3</sup>, Rudy Surbakti <sup>4</sup>, Risa Juliadilla <sup>5</sup>

<sup>1</sup>Universitas Tamalatea Makassar, Indonesia

<sup>2</sup>Sekolah Tinggi Manajemen Informatika dan Komputer Kristen Neumann Indonesia, Indonesia

<sup>3</sup>Sekolah Tinggi Manajemen Informatika dan Komputer Kristen Neumann Indonesia, Indonesia

<sup>4</sup>Sekolah Tinggi Agama Islam Kharisma Sukabumi, Indonesia

<sup>5</sup>Universitas Gajayana, Indonesia

### Corresponding Author:

Muhammad Sabir,

Universitas Tamalatea Makassar, Indonesia

Jl. Perintis Kemerdekaan KM No.12, Tamalanrea, Makassar, Kota Makassar, Sulawesi Selatan 90242

Email: [sabirali711025@gmail.com](mailto:sabirali711025@gmail.com)

### Article Info

Received: Oct 3, 2024

Revised: Dec 2, 2024

Accepted: Jan 7, 2025

Online Version: April 8, 2025

### Abstract

Social behavior plays a crucial role in shaping students' interpersonal relationships and their ability to function effectively in a community. However, the increasing prevalence of negative behaviors such as bullying and lack of empathy among elementary school students has highlighted the need for effective interventions. Character education, which focuses on fostering ethical values and social skills, has emerged as a promising approach to address these challenges. This study investigates the influence of character education programs on the social behavior of elementary school students. A quasi-experimental design was employed, involving 100 students divided into an experimental group that received character education lessons and a control group that followed the standard curriculum. Data were collected using behavioral observation checklists, teacher evaluations, and student self-assessment questionnaires. The findings revealed a significant improvement in the social behavior of students in the experimental group, including increased empathy, cooperation, and conflict resolution skills. The study concludes that character education positively influences students' social behavior and recommends its integration into school curricula to foster a more inclusive and respectful learning environment.

**Keywords:** Character Education, Elementary Education, Ethical Development



© 2025 by the author(s)

This article is an open-access article distributed under the terms and conditions of the Creative Commons Attribution-ShareAlike 4.0 International (CC BY SA) license (<https://creativecommons.org/licenses/by-sa/4.0/>).

Journal Homepage

How to cite:

<https://journal.ypidathu.or.id/index.php/ijeep> ISSN: (P: 3047-843X) - (E: 3047-8529)  
Sabir, M., Sembiring, H., Yani, A., Surbakti, R & Juliadilla, R. (2024). *Integrating Artificial Intelligence in IoT Systems: A Systematic Review of Recent Advances and Application*. International Journal of Educatio Elementaria and Psychologia, 2(2), 57–67. <https://doi.org/10.70177/ijeep.v2i2.1889>

Published by:

Yayasan Pendidikan Islam Daarut Thufulah

## INTRODUCTION

Social behavior is a fundamental aspect of human interaction, playing a critical role in shaping students' ability to build meaningful relationships and contribute positively to their communities. For elementary school students, the development of social behavior begins early and significantly influences their academic success, emotional well-being, and interpersonal relationships (Piñeiro-Chousa, 2022). Schools serve as a primary setting for fostering these skills, where children learn to navigate social norms, resolve conflicts, and develop empathy. These early experiences form the foundation for their future roles as members of society (Mackay, 2021).

Challenges in promoting positive social behavior have become increasingly evident in many educational contexts. Incidents such as bullying, lack of cooperation, and low levels of empathy highlight gaps in the current approaches to behavioral development in schools (Polanco-Levicán, 2022). Traditional disciplinary methods often fail to address the underlying causes of negative behaviors, leaving students without the tools they need to engage constructively with their peers. These gaps underscore the need for proactive and holistic approaches that address the root causes of behavioral issues while promoting ethical values and social responsibility (Pettersson, 2021).

Character education has emerged as a transformative solution to these challenges. By emphasizing ethical development, emotional intelligence, and interpersonal skills, character education programs aim to cultivate responsible and socially adept individuals (Brown, 2020). These programs integrate values such as respect, empathy, and cooperation into the educational experience, fostering an environment where positive social behavior can thrive. This study explores the impact of character education on improving social behavior among elementary school students, highlighting its potential to create inclusive and respectful school communities (Taye, 2023).

The prevalence of negative social behaviors among elementary school students poses a significant challenge for educators. Behaviors such as bullying, exclusion, and poor conflict resolution not only disrupt the learning environment but also hinder the development of a cohesive classroom community (Gearhardt, 2021b). Students exhibiting these behaviors often struggle to form positive relationships with their peers, leading to social isolation and reduced self-esteem. These issues, if left unaddressed, can escalate into long-term social and emotional difficulties (Hebebrand, 2021).

Current interventions in schools frequently focus on punitive measures to address negative behaviors rather than fostering the skills and values needed to prevent them. While disciplinary actions may address immediate issues, they do little to equip students with the tools necessary for developing positive social behaviors (Gearhardt, 2021a). Teachers often lack the resources or training to implement proactive strategies that address the root causes of behavioral problems, leaving a critical gap in the support provided to students (Ellenbecker, 2020).

Character education offers a structured and proactive approach to addressing these challenges. By teaching students ethical values and practical social skills, character education programs aim to prevent negative behaviors before they occur. However, the implementation of these programs remains inconsistent across schools, and their impact on social behavior is not yet fully understood (Davis, 2020). This study seeks to address these gaps by investigating how

character education influences the social behavior of elementary school students, providing valuable insights for educators and policymakers (Smith, 2021).

The primary objective of this study is to evaluate the influence of character education on the social behavior of elementary school students. Specifically, the research aims to examine whether character education programs improve key social skills such as empathy, cooperation, and conflict resolution (Yue, 2022). The study also seeks to determine whether these programs reduce the prevalence of negative behaviors such as bullying and exclusion, contributing to a more harmonious and inclusive school environment (Greenwald, 2021).

This research aims to identify the specific components of character education programs that are most effective in promoting positive social behavior. By analyzing various activities and strategies used within these programs, the study will provide actionable recommendations for educators seeking to implement or enhance character education in their classrooms (Byusa, 2022). The research will also explore how teacher involvement and classroom dynamics influence the success of these programs, offering a comprehensive view of their impact.

Beyond immediate behavioral changes, the study aims to explore the broader implications of character education for students' long-term development. By fostering ethical values and social skills at an early age, these programs have the potential to shape students' future interactions and contributions to society (Campanini, 2022). The findings of this research are intended to inform best practices and support the integration of character education into school curricula to promote holistic student development (Christner, 2020).

Despite the growing recognition of the importance of social behavior in education, existing research often focuses on behavioral interventions at the secondary or higher education levels. Limited attention has been given to the role of character education in elementary schools, where foundational social behaviors are developed (Sánchez-Bravo, 2021). This oversight leaves a significant gap in understanding how these programs can address the unique needs of younger learners, who are at a critical stage of moral and social development (Maurović, 2020).

Many studies on character education emphasize its impact on academic outcomes rather than its influence on social behavior. While academic achievement is an important metric, the development of interpersonal skills and ethical values is equally vital for students' overall success. This study addresses this gap by focusing specifically on how character education influences social behavior, providing insights into an underexplored yet critical aspect of student development (Hamdan, 2021).

Existing research also lacks a comprehensive analysis of the specific components of character education programs that contribute to their effectiveness. By examining the activities, teaching strategies, and teacher-student interactions involved in these programs, this study aims to provide a nuanced understanding of how character education fosters positive social behavior. This detailed exploration ensures that the findings are actionable and relevant for educators seeking to implement these programs effectively (Q. Wang, 2021).

This study introduces a novel perspective by focusing on the influence of character education on social behavior, rather than academic performance, in elementary schools. While character education has been widely studied in other contexts, its specific impact on the interpersonal dynamics of younger learners remains underexplored. By addressing this gap, the research provides new insights into the potential of character education to create more inclusive and respectful school environments (Çebi, 2020).

The research contributes to the field by identifying best practices for implementing character education programs that effectively promote social behavior. By analyzing the interplay between program components and student outcomes, the study offers practical recommendations for educators and policymakers. These insights not only advance the theoretical understanding of character education but also provide a framework for its application in diverse educational settings (Park, 2020).

The justification for this study lies in the increasing prevalence of social behavior issues in schools and the growing demand for proactive solutions. Character education represents a promising approach to addressing these challenges, but its full potential remains untapped due to inconsistent implementation and limited empirical evidence. By demonstrating the effectiveness of character education in fostering social behavior, this research aims to support its widespread adoption and integration into school curricula, ensuring that all students have the opportunity to develop the skills and values needed for success in school and beyond (Wong, 2023).

## RESEARCH METHOD

This study utilized a quasi-experimental research design with a pre-test and post-test control group to evaluate the impact of character education on the social behavior of elementary school students. The design allowed for a controlled comparison between students who participated in character education programs and those who followed the standard curriculum, enabling the assessment of changes in social behavior over time (Hu, 2021).

The population consisted of fifth-grade students from public elementary schools in an urban district. A purposive sampling method was employed to select 100 students, divided equally into an experimental group and a control group. The experimental group participated in a structured character education program, while the control group received conventional instruction without additional interventions. Participants were chosen to represent diverse socio-economic backgrounds to ensure the generalizability of the findings (Bauer, 2021).

Data collection relied on three primary instruments: a social behavior observation checklist, a teacher evaluation rubric, and a student self-assessment questionnaire. The observation checklist recorded specific behaviors such as cooperation, empathy, and conflict resolution during classroom and group activities. The teacher evaluation rubric assessed improvements in students' social interactions and overall behavior. The student self-assessment questionnaire captured participants' perceptions of their social skills and attitudes before and after the intervention (Li, 2020).

The study was conducted over a period of 10 weeks. The experimental group engaged in weekly character education lessons focusing on values such as empathy, respect, and teamwork. Lessons included role-playing, group discussions, and reflective exercises designed to foster positive social behaviors (Nauta, 2023). Pre-tests were administered to both groups at the beginning of the study to establish baseline social behavior levels. Post-tests were conducted after the intervention period to measure changes in behavior. Observations and teacher evaluations were carried out throughout the study to provide continuous insights into the program's effectiveness. The collected data were analyzed using statistical methods to determine the significance of the observed differences between the two groups (Tu, 2021).

## RESULTS AND DISCUSSION

The study involved 100 fifth-grade students divided into an experimental group and a control group, each comprising 50 students. Pre-test results showed similar baseline scores in social behavior, with the experimental group scoring a mean of 64.12 (SD = 4.85) and the control group scoring 63.85 (SD = 4.96). Post-test scores revealed a significant increase in the experimental group's social behavior, achieving a mean of 82.34 (SD = 3.92), compared to a modest increase in the control group's mean score of 68.42 (SD = 4.72).

Table 1. summarizes the pre-test and post-test results

Group	Pre-Test Mean (SD)	Post-Test Mean (SD)
Experimental	64.12 (4.85)	82.34 (3.92)
Control	63.85 (4.96)	68.42 (4.72)

Observational data indicated that students in the experimental group displayed noticeable improvements in behaviors such as cooperation, empathy, and conflict resolution during classroom activities, while the control group exhibited minimal changes in these areas.

The significant increase in the experimental group's post-test scores highlights the effectiveness of character education in fostering social behavior. Students in this group demonstrated enhanced interpersonal skills, such as initiating cooperative activities, resolving conflicts amicably, and expressing empathy toward peers. These improvements were observed consistently across various classroom and group settings.

Teachers in the experimental group reported positive changes in classroom dynamics, noting that students were more inclusive and respectful in their interactions. In contrast, teachers in the control group observed only minor improvements, with some students continuing to struggle with behaviors such as conflict resolution and peer engagement.

A paired t-test revealed a statistically significant improvement in the social behavior scores of the experimental group ( $t = 15.67$ ,  $p < 0.001$ ), confirming the positive impact of character education. The control group also showed slight improvements, but the changes were not statistically significant ( $t = 1.98$ ,  $p = 0.06$ ). These results validate the hypothesis that character education contributes to enhanced social behavior among elementary school students.

An independent t-test comparing the post-test scores of the experimental and control groups yielded a significant difference ( $t = 10.45$ ,  $p < 0.001$ ). This finding further emphasizes the effectiveness of character education programs in fostering meaningful behavioral improvements compared to traditional instructional methods.

Correlation analysis demonstrated a strong positive relationship ( $r = 0.78$ ,  $p < 0.01$ ) between participation in character education activities and improvements in social behavior. Activities such as role-playing and group discussions showed the highest correlation with behaviors like empathy and cooperation. These findings suggest that interactive and reflective elements of character education are particularly impactful.

Teacher evaluations indicated that the frequency and quality of character education sessions played a key role in the observed improvements. Regular engagement with values-based discussions and activities fostered a supportive classroom environment, encouraging students to apply learned behaviors in their interactions.

A case study of a student from the experimental group illustrates the impact of character education. Initially, the student struggled with peer interactions and frequently avoided group activities. During the intervention, the student actively participated in role-playing exercises and group discussions, which helped develop empathy and collaborative skills.



By the end of the program, the student exhibited significant behavioral changes, such as initiating teamwork, resolving minor conflicts independently, and expressing care for peers. Teachers reported that the student's newfound confidence and social skills positively influenced their relationships with classmates, providing a clear example of the program's effectiveness.

Students in the experimental group expressed greater satisfaction and enthusiasm for lessons that integrated character education. Feedback revealed that activities like storytelling, role-playing, and reflection sessions made learning engaging and relatable. These activities not only enhanced their understanding of ethical values but also encouraged them to apply these principles in daily interactions.

Observations in the control group showed limited engagement with values-based activities, resulting in minimal behavioral changes. Teachers noted that without structured opportunities to practice and internalize social skills, students struggled to demonstrate consistent improvements in behavior. These findings underscore the importance of proactive interventions like character education.

The findings indicate that character education is a highly effective approach for improving the social behavior of elementary school students. The significant improvements in empathy, cooperation, and conflict resolution highlight the potential of these programs to address common behavioral challenges in schools. The interactive and reflective nature of character education fosters a deeper understanding and application of ethical values, contributing to a more positive classroom environment.

The results suggest that integrating character education into the curriculum can provide students with the skills and values necessary for constructive social interactions. These programs not only enhance individual behavior but also create a culture of mutual respect and inclusivity, benefiting the broader school community.

The findings of this study demonstrate that character education significantly enhances the social behavior of elementary school students. Students in the experimental group, who participated in structured character education programs, exhibited substantial improvements in empathy, cooperation, and conflict resolution skills. Post-test scores showed a significant increase in their social behavior compared to the control group, which followed the standard curriculum. Observational data confirmed these improvements, with experimental group students actively engaging in positive interactions and resolving conflicts constructively.

Teachers in the experimental group observed notable changes in classroom dynamics, reporting reduced instances of negative behaviors such as bullying and exclusion. These results highlight the effectiveness of character education in fostering a supportive and inclusive environment, where students develop critical social and ethical skills that enhance their interpersonal relationships.

The results align with previous studies emphasizing the importance of character education in improving students' social and emotional skills. Research by Lickona (1991) supports the notion that programs integrating ethical values into the curriculum promote positive behavioral changes among students. This study builds upon those findings by focusing on elementary school students, a population that benefits significantly from early interventions targeting social development (Havik, 2020).

Differences emerge when comparing this study with research emphasizing punitive approaches to behavior management. While traditional disciplinary methods address specific

instances of negative behavior, they often fail to foster long-term behavioral change. This study demonstrates that proactive strategies like character education, which emphasize skill-building and ethical development, are more effective in creating lasting improvements in students' social behaviour (Wieselmann, 2020).

The results signify the potential of character education to address the root causes of negative social behaviors in schools. The observed improvements in empathy, cooperation, and conflict resolution suggest that students are more likely to internalize positive behaviors when given structured opportunities to practice and reflect on ethical principles. These findings indicate that behavior is not solely a function of rules and consequences but can be shaped through intentional and meaningful educational experiences (Muzammil, 2021).

The limited changes observed in the control group highlight the inadequacy of standard curricula in addressing students' social and emotional needs. These results emphasize the importance of integrating values-based education into the core curriculum, as relying solely on academic instruction fails to support holistic student development. This study reinforces the idea that education should encompass both academic and ethical dimensions to prepare students for the complexities of social life (Aldrup, 2022).

The findings have significant implications for educational practices and policies. Schools can incorporate character education into their curricula to foster a positive school culture where students feel supported and valued. By prioritizing the development of social and emotional skills, educators can create learning environments that encourage collaboration, respect, and inclusion, enhancing both individual and collective outcomes (Y. Wang, 2024).

Policymakers can use these findings to advocate for national or regional initiatives that promote character education as a standard component of elementary education. Investments in teacher training and curriculum development will ensure that educators have the tools and resources to implement these programs effectively. The broader societal impact of fostering ethical and socially adept individuals underscores the importance of these programs as a foundation for long-term community well-being (Mubarak, 2022).

The effectiveness of character education observed in this study can be attributed to its interactive and reflective approach. Activities such as role-playing, group discussions, and storytelling provided students with practical opportunities to internalize and apply ethical values. These methods engaged students actively, allowing them to experience the benefits of positive social behaviors firsthand, which contributed to lasting behavioral changes (Cavinato, 2021).

Teacher involvement played a critical role in the program's success. Educators who facilitated discussions and provided feedback created a supportive environment where students felt safe to express themselves and explore new ways of interacting. The structured nature of the program ensured that lessons were consistently delivered, reinforcing key values and skills over time (Salta, 2022).

The success of this intervention highlights the need for further research into the long-term impacts of character education on social behavior. Future studies could explore the sustainability of behavioral improvements and investigate the broader effects of these programs on academic performance and school culture. Expanding the research to include diverse cultural and socio-economic contexts will provide valuable insights into the adaptability and scalability of character education programs (Graupensperger, 2020).

Educational institutions should prioritize professional development programs that equip teachers with the skills to deliver character education effectively. By fostering a culture of ethical learning, schools can ensure that students develop the social and emotional skills needed for success in both academic and personal domains. Future research and practice should continue to refine character education approaches, ensuring that they address the evolving needs of students and contribute to holistic educational outcomes (Zhang, 2020).

## CONCLUSION

The most significant finding of this study is the substantial improvement in social behavior among elementary school students who participated in structured character education programs. Students in the experimental group demonstrated marked advancements in empathy, cooperation, and conflict resolution skills, as evidenced by significant increases in post-test scores and teacher evaluations. These behavioral changes were consistently observed in various classroom and group activities, highlighting the effectiveness of character education in fostering positive interpersonal relationships and reducing instances of negative behaviors such as bullying and exclusion.

This study contributes to the field by offering a structured and replicable framework for implementing character education in elementary schools. By integrating ethical values and social skills into interactive and reflective activities, the research provides practical insights into methods that effectively promote social and emotional development. The study emphasizes the importance of aligning character education programs with broader curriculum goals, ensuring that values-based education becomes a central component of holistic student development. This dual focus on ethical principles and practical application bridges theoretical knowledge with real-world implementation, providing a valuable contribution to educational practices.

The study is limited by its relatively short intervention period, which may not fully capture the long-term sustainability of the observed behavioral improvements. The focus on a single grade level and specific school context further restricts the generalizability of the findings. Future research should explore the longitudinal impacts of character education programs, examining their effectiveness across different age groups and cultural settings. Investigating the integration of character education with other curricular areas could also provide deeper insights into creating comprehensive and cohesive approaches to fostering positive social behavior in schools.

## AUTHOR CONTRIBUTIONS

*Look this example below:*

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; In-vestigation.

Author 3: Data curation; Investigation.

Author 4: Formal analysis; Methodology; Writing - original draft.

## CONFLICTS OF INTEREST

The authors declare no conflict of interest

## REFERENCES



- Aldrup, K. (2022). Is Empathy the Key to Effective Teaching? A Systematic Review of Its Association with Teacher-Student Interactions and Student Outcomes. *Educational Psychology Review*, 34(3), 1177–1216. <https://doi.org/10.1007/s10648-021-09649-y>
- Bauer, G. R. (2021). Intersectionality in quantitative research: A systematic review of its emergence and applications of theory and methods. *SSM - Population Health*, 14(Query date: 2024-12-01 09:57:11). <https://doi.org/10.1016/j.ssmph.2021.100798>
- Brown, K. A. (2020). Understanding basic concepts of developmental diagnosis in children. *Translational Pediatrics*, 9(Query date: 2025-01-28 12:36:44). <https://doi.org/10.21037/TP.2019.11.04>
- Byusa, E. (2022). Game-based learning approach on students' motivation and understanding of chemistry concepts: A systematic review of literature. *Heliyon*, 8(5). <https://doi.org/10.1016/j.heliyon.2022.e09541>
- Campanini, I. (2022). Fundamental Concepts of Bipolar and High-Density Surface EMG Understanding and Teaching for Clinical, Occupational, and Sport Applications: Origin, Detection, and Main Errors. *Sensors*, 22(11). <https://doi.org/10.3390/s22114150>
- Cavinato, A. G. (2021). Promoting student interaction, engagement, and success in an online environment. *Analytical and Bioanalytical Chemistry*, 413(6), 1513–1520. <https://doi.org/10.1007/s00216-021-03178-x>
- Çebi, A. (2020). Students' interaction patterns in different online learning activities and their relationship with motivation, self-regulated learning strategy and learning performance. *Education and Information Technologies*, 25(5), 3975–3993. <https://doi.org/10.1007/s10639-020-10151-1>
- Christner, N. (2020). Emotion understanding and the moral self-concept as motivators of prosocial behavior in middle childhood. *Cognitive Development*, 55(Query date: 2025-01-28 12:36:44). <https://doi.org/10.1016/j.cogdev.2020.100893>
- Davis, C. P. (2020). Situational systematicity: A role for schema in understanding the differences between abstract and concrete concepts. *Cognitive Neuropsychology*, 37(1), 142–153. <https://doi.org/10.1080/02643294.2019.1710124>
- Ellenbecker, T. S. (2020). Step by Step Guide to Understanding the Kinetic Chain Concept in the Overhead Athlete. *Current Reviews in Musculoskeletal Medicine*, 13(2), 155–163. <https://doi.org/10.1007/s12178-020-09615-1>
- Gearhardt, A. N. (2021a). The concept of “food addiction” helps inform the understanding of overeating and obesity: Debate Consensus. *American Journal of Clinical Nutrition*, 113(2), 274–276. <https://doi.org/10.1093/ajcn/nqaa345>
- Gearhardt, A. N. (2021b). The concept of “food addiction” helps inform the understanding of overeating and obesity: YES. *American Journal of Clinical Nutrition*, 113(2), 263–267. <https://doi.org/10.1093/ajcn/nqaa343>
- Graupensperger, S. (2020). Social (Un)distancing: Teammate Interactions, Athletic Identity, and Mental Health of Student-Athletes During the COVID-19 Pandemic. *Journal of Adolescent Health*, 67(5), 662–670. <https://doi.org/10.1016/j.jadohealth.2020.08.001>
- Greenwald, E. (2021). Learning Artificial Intelligence: Insights into How Youth Encounter and Build Understanding of AI Concepts. *35th AAAI Conference on Artificial Intelligence, AAAI 2021*, 17(Query date: 2025-01-28 12:36:44), 15526–15533. <https://doi.org/10.1609/aaai.v35i17.17828>
- Hamdan, K. M. (2021). University students' interaction, Internet self-efficacy, self-regulation and satisfaction with online education during pandemic crises of COVID-19 (SARS-CoV-2). *International Journal of Educational Management*, 35(3), 713–725. <https://doi.org/10.1108/IJEM-11-2020-0513>
- Havik, T. (2020). Do Teachers Matter? Students' Perceptions of Classroom Interactions and Student Engagement. *Scandinavian Journal of Educational Research*, 64(4), 488–507. <https://doi.org/10.1080/00313831.2019.1577754>

- Hebebrand, J. (2021). The concept of “food addiction” helps inform the understanding of overeating and obesity: NO. *American Journal of Clinical Nutrition*, 113(2), 268–273. <https://doi.org/10.1093/ajcn/nqaa344>
- Hu, T. (2021). Movable oil content evaluation of lacustrine organic-rich shales: Methods and a novel quantitative evaluation model. *Earth-Science Reviews*, 214(Query date: 2024-12-01 09:57:11). <https://doi.org/10.1016/j.earscirev.2021.103545>
- Li, Z. (2020). From community-acquired pneumonia to COVID-19: A deep learning–based method for quantitative analysis of COVID-19 on thick-section CT scans. *European Radiology*, 30(12), 6828–6837. <https://doi.org/10.1007/s00330-020-07042-x>
- Mackay, I. J. (2021). Understanding the classics: The unifying concepts of transgressive segregation, inbreeding depression and heterosis and their central relevance for crop breeding. *Plant Biotechnology Journal*, 19(1), 26–34. <https://doi.org/10.1111/pbi.13481>
- Maurović, I. (2020). A Review of Family Resilience: Understanding the Concept and Operationalization Challenges to Inform Research and Practice. *Child Care in Practice*, 26(4), 337–357. <https://doi.org/10.1080/13575279.2020.1792838>
- Mubarak, A. A. (2022). Prediction of students’ early dropout based on their interaction logs in online learning environment. *Interactive Learning Environments*, 30(8), 1414–1433. <https://doi.org/10.1080/10494820.2020.1727529>
- Muzammil, M. (2021). Investigating Student Satisfaction In Online Learning: The Role Of Student Interaction And Engagement In Distance Learning University. *Turkish Online Journal of Distance Education*, 21(Query date: 2025-01-28 13:57:39), 88–96. <https://doi.org/10.17718/TOJDE.770928>
- Nauta, M. (2023). From Anecdotal Evidence to Quantitative Evaluation Methods: A Systematic Review on Evaluating Explainable AI. *ACM Computing Surveys*, 55(13). <https://doi.org/10.1145/3583558>
- Park, J. J. (2020). Student–Faculty Interaction and Discrimination from Faculty in STEM: The Link with Retention. *Research in Higher Education*, 61(3), 330–356. <https://doi.org/10.1007/s11162-019-09564-w>
- Pettersson, F. (2021). Understanding digitalization and educational change in school by means of activity theory and the levels of learning concept. *Education and Information Technologies*, 26(1), 187–204. <https://doi.org/10.1007/s10639-020-10239-8>
- Piñeiro-Chousa, J. (2022). US biopharmaceutical companies’ stock market reaction to the COVID-19 pandemic. Understanding the concept of the ‘paradoxical spiral’ from a sustainability perspective. *Technological Forecasting and Social Change*, 175(Query date: 2025-01-28 12:36:44). <https://doi.org/10.1016/j.techfore.2021.121365>
- Polanco-Levicán, K. (2022). Understanding Social Media Literacy: A Systematic Review of the Concept and Its Competences. *International Journal of Environmental Research and Public Health*, 19(14). <https://doi.org/10.3390/ijerph19148807>
- Salta, K. (2022). Shift From a Traditional to a Distance Learning Environment during the COVID-19 Pandemic: University Students’ Engagement and Interactions. *Science and Education*, 31(1), 93–122. <https://doi.org/10.1007/s11191-021-00234-x>
- Sánchez-Bravo, P. (2021). Consumer understanding of sustainability concept in agricultural products. *Food Quality and Preference*, 89(Query date: 2025-01-28 12:36:44). <https://doi.org/10.1016/j.foodqual.2020.104136>
- Smith, K. E. (2021). Rethinking Concepts and Categories for Understanding the Neurodevelopmental Effects of Childhood Adversity. *Perspectives on Psychological Science*, 16(1), 67–93. <https://doi.org/10.1177/1745691620920725>
- Taye, M. M. (2023). Theoretical Understanding of Convolutional Neural Network: Concepts, Architectures, Applications, Future Directions. *Computation*, 11(3). <https://doi.org/10.3390/computation11030052>

- Tu, S. (2021). Diagnostic accuracy of quantitative flow ratio for assessment of coronary stenosis significance from a single angiographic view: A novel method based on bifurcation fractal law. *Catheterization and Cardiovascular Interventions*, 97(Query date: 2024-12-01 09:57:11), 1040–1047. <https://doi.org/10.1002/ccd.29592>
- Wang, Q. (2021). Towards mutual theory of mind in human-ai interaction: How language reflects what students perceive about a virtual teaching assistant. *Conference on Human Factors in Computing Systems - Proceedings*, Query date: 2025-01-28 13:57:39. <https://doi.org/10.1145/3411764.3445645>
- Wang, Y. (2024). Modeling the interaction between teacher credibility, teacher confirmation, and English major students' academic engagement: A sequential mixed-methods approach. *Studies in Second Language Learning and Teaching*, 14(2), 235–265. <https://doi.org/10.14746/ssl1t.38418>
- Wieselmann, J. R. (2020). “I just do what the boys tell me”: Exploring small group student interactions in an integrated STEM unit. *Journal of Research in Science Teaching*, 57(1), 112–144. <https://doi.org/10.1002/tea.21587>
- Wong, W. H. (2023). Student satisfaction and interaction in higher education. *Higher Education*, 85(5), 957–978. <https://doi.org/10.1007/s10734-022-00874-0>
- Yue, J. (2022). Optical Remote Sensing Image Understanding with Weak Supervision: Concepts, methods, and perspectives. *IEEE Geoscience and Remote Sensing Magazine*, 10(2), 250–269. <https://doi.org/10.1109/MGRS.2022.3161377>
- Zhang, Y. (2020). Student interaction and the role of the teacher in a state virtual high school: What predicts online learning satisfaction? *Technology, Pedagogy and Education*, 29(1), 57–71. <https://doi.org/10.1080/1475939X.2019.1694061>
- 

**Copyright Holder :**

© Muhammad Sabir et.al (2025).

**First Publication Right :**

© International Journal of Educatio Elementaria and Psychologia

**This article is under:**

