ASEAN Journal of Educational Research and Technology

Journal homepage: https://ejournal.bumipublikasinusantara.id/index.php/ajert

Evaluation of Robotics Class in a Private School in the Philippines

Ricardo Cruz Ahillon Jr.[1], Sabella Resanie C. Cadiong[2], Alaric B. Tomeldan[2], Arrah Crisrei B. Belgira[2], Alfonso Rafael A. Ayaya[2], Althea Dominique M. Paredes[2], Dominick Johan G. Balajadia[2], Ron Gabriel F. Sumandal[2], Lionel Decasa Basilio[2], Kaizen C. Quindra[2]*

[1]Department of Education-Rizal, the Philippines
[2]Ianthe Christian Academy, Zambales, the Philippines
*Correspondence: E-mail: ricardoahillonjr101515@gmail.com

ABSTRACT

The present study aimed to evaluate the robotics class at Ianthe Christian Academy. This present study used descriptive research using a survey. Respondents in the study were parents and learners at Ianthe Christian Academy as they participated in outdoor classes. These are Grade 3 to 6 learners. Samples were chosen from the population using simple random sampling. Parent-respondents were identified using Part I: Profile of the respondents which includes age, sex, and economic status. Part II: Teaching and Part III: Learning describe the teaching and learning on outdoor activities at Ianthe Christian School. The scale described how outdoor activities happened in the school. Findings revealed that parents strongly agreed on Teaching and Learning Robotics Classes, learners performed outstandingly in various subject areas, and there is no relationship between both teaching and learning in the academic performance of learners. Parents were satisfied with the robotics class in school, learners showed enthusiasm and commitment to their subjects taken, and they did not directly affect learners' performance in robotics class. Parents should be engaged in the learning experience of the learners in the robotics class, providing additional worksheets that enhance the skills of learners, and encouraging parents to communicate with teachers.

ARTICLE INFO

Article History:
Submitted/Received 03 Mar 2024
First Revised 28 Apr 2024
Accepted 18 Jun 2024
First Available online 19 Jun 2024
Publication Date 01 Mar 2025

Keyword:
Evaluation of teaching and learning of robotics,
Performance of learners,
Robotic class.

1. INTRODUCTION

Robotics class is a technology-driven society designed to nurture children's passion for robotics. This subject not only encourages creativity but also aids students in the programming of robots (Ayeni *et al*., 2024). The class provides a technologically advanced environment where students can explore and develop their skills in the exciting field of robotics (Talib et al., 2020). In the future, robotics classes play a crucial role in fostering innovation and shaping learners into problem-solvers (Chevalier *et al*., 2023). The significance of programming skills cannot be overstated for the new generation, as it empowers them to influence and transform the future (Dwivedi *et al*., 2020). Without a foundation in robotics education, individuals may encounter challenges in various aspects of their work, such as troubleshooting and programming (Sapounidis and Alimisis, 2020). Therefore, investing in robotics classes not only prepares learners for the evolving demands of the future but also equips them with essential skills for navigating and excelling in a technology-driven world (Ouyang *et al*., 2024).

Ianthe Christian Academy is forward-thinking in its approach to education, offering robotics classes to equip students for their future careers. The emphasis on technology is not only geared toward preparing students for the job market but also toward making the learning experience enjoyable (Carstens *et al*., 2021) and engaging (Kyprianou *et al*., 2023). Through these classes, students at ICA not only enhance their technological skills but also foster innovation and intelligence. The utilization of the robot adds a dynamic element to the learning process, offering various functionalities and multiple variations (Mukherjee et al., 2020). What sets ICA apart is the frequency and depth of its engagement with robotics education. With more regular exposure to robotics, ICA students gain a substantial advantage over their counterparts in other schools. This advantage is not just theoretical; it translates into a practical understanding (Janssen et al., 2023) and mastery of robotics that gives ICA students a competitive edge. Overall, Ianthe Christian Academy's commitment to integrating robotics into its curriculum not only prepares students for the future job market but also ensures they develop a heightened proficiency and advantage in this increasingly crucial field of study.

For this reason, the researchers of the present study would like to evaluate the robotics class at Ianthe Christian School, SY 2023-2024.

2. METHODS

This present study used descriptive-correlational research using a survey. Respondents in the study were parents and learners at Ianthe Christian Academy as they participated in robotics class. These were Grade 3 to 6 learners. Samples were chosen from the population using simple random sampling. Parent-respondents identified using Part I: Profile of the respondents which includes age, sex, and economic status. Part II: Teaching and Part III: Learning They described the teaching and learning in a robotics class at Ianthe Christian School. The scale described how outdoor activities happened in the school (see **Table 1**).

Table 1. The scale for outdoor activities.

Scale	Verbal Interpretation
4	Strongly Agree
3	Agree
2	Disagree
1	Strongly Disagree

DOI:
p- ISSN: 2828-4887 e- ISSN: 2828-4860

Performance of the learners in English, Mathematics, and Science were identified using the learner's grades in Quarters 1 and 2 (see **Table 2**).

Table 2. The scale for subject.

Scale	Verbal Interpretation
90-100	Outstanding
85-89	Very Satisfactory
80-84	Satisfactory
75-79	Fairly Satisfactory
Below 74	Did Not Meet the Expectations

3. RESULTS AND DISCUSSION

3.1. Assessment of Parents on Teaching and Learning in Robotics Class

Table 3 shows the results from the assessment of parents for the teaching process. This implies that parents believe the teaching staff effectively communicate robotics concepts and principles to their child during lessons and have seen that the teaching staff demonstrate a strong understanding of robotics fundamentals and can convey them in an accessible manner to learners. Also, they have seen that the teaching staff create engaging and interactive lessons that foster my child's interest and enthusiasm for robotics. In addition, they noticed improvements in my child's problem-solving abilities because of the teaching methods employed during robotics class.

Table 3. Assessment of parents in teaching in robotics class.

	Teaching (As a parent, I ……)	Mean	Verbal Interpretation
1.	Believe the teaching staff effectively communicate robotics concepts and principles to my child during lessons	3.60	Strongly Agree
2.	Have seen that the teaching staff demonstrate a strong understanding of robotics fundamentals and can convey them in an accessible manner to learners.	3.60	Strongly Agree
3.	Appreciate the patience and support provided by the teaching staff as my child navigates through the challenges of learning robotics.	3.53	Strongly Agree
4.	Have seen that the teaching staff create engaging and interactive lessons that foster my child's interest and enthusiasm for robotics.	3.60	Strongly Agree
5.	Notice improvements in my child's problem-solving abilities because of the teaching methods employed during robotics lessons.	3.60	Strongly Agree
6.	Notice the teaching staff effectively tailor instruction to meet the individual learning needs and pace of my child in robotics lessons.	3.53	Strongly Agree
7.	Feel confident in the teaching staff's ability to create a supportive and inclusive learning environment for my child during robotics lessons.	3.53	Strongly Agree
8.	Notice that the teaching staff integrates real-world applications and examples into robotics lessons, enhancing my child's understanding and relevance of the subject matter.	3.60	Strongly Agree

DOI:
p- ISSN: 2828-4887 e- ISSN: 2828-4860

Table 3 (continue). Assessment of parents in teaching in robotics class.

	Teaching (As a parent, I ……)	Mean	Verbal Interpretation
9.	Perceive the teaching staff as dedicated educators who prioritize my child's academic growth and development through their involvement in robotics education.	3.53	Strongly Agree
10.	Have noticed that the majority of parents express satisfaction with the teaching methods and effectiveness of instruction in robotics lessons at the Christian Academy.	3.53	Strongly Agree
	Weighted Mean	3.57	Strongly Agree

Note: 3.01-4.00-Strongly Agree, 2.01-3.00-Agree, 1.01-2.00-Disagree, 0.00-1.00- Strongly Disagree.

It affirms the study of You *et al.* (2021) that students with early exposure to the fields of science, technology, engineering, and mathematics (STEM) through the robotics class. Furthermore, Cameron (2020) says that it is important to be conversant with STEM ideas in a world that is becoming more and more technological. Having taken note of this fact, parents observed that their children were urged by this class not just to think about becoming proficient in mechanics and electronics, but also to think beyond it in terms of other employment-dependent disciplines under the same umbrella.

Table 4 shows the results from the assessment of parents for the learning process. It implies that parents are pleased to see their child's enthusiasm for learning and problem-solving cultivated through their engagement with robotics lessons. They have seen that their child demonstrates increased logical thinking and reasoning abilities after engaging with robotics concepts in their lessons. Furthermore, parents notice a greater sense of confidence in their child's approach to tackling technological challenges, which is attributed to their participation in robotics education.

Table 4. Assessment of parents in learning robotics class.

	Learning (As a parent, I ……)	Mean	Verbal Interpretation
1.	Observe that my child's problem-solving skills have improved as a result of participating in robotics class	3.40	Strongly Agree
2.	Have seen that my child demonstrates increased logical thinking and reasoning abilities after engaging with robotics concepts in their lessons.	3.53	Strongly Agree
3.	Notice a greater sense of confidence in my child's approach to tackling technological challenges, which I attribute to their participation in robotics education.	3.33	Strongly Agree
4.	Observe that my child exhibits a deeper understanding of computational thinking principles and their practical applications in daily life through their robotics lessons.	3.60	Strongly Agree
5.	See my child becoming more proficient in computer literacy skills, such as typing, navigating software interfaces, and understanding programming languages.	3.40	Strongly Agree
6.	Observe my child's creativity and innovation are sparked or enhanced by their experiences in robotics lessons at Ianthe Christian School.	3.40	Strongly Agree
7.	Observe my child developing strong attention to detail and precision in their work, reflecting the structured nature of robotics tasks.	3.40	Strongly Agree

DOI:
p- ISSN: 2828-4887 e- ISSN: 2828-4860

Table 4 (continue). Assessment of parents in learning robotics class.

	Learning (As a parent, I ……)	Mean	Verbal Interpretation
9.	Have noticed that my child's interest in STEM subjects, particularly in technology and computer science, has been nurtured through their participation in robotics class.	3.33	Strongly Agree
10.	Believe that robotics lessons in school have equipped my child with valuable skills for future academic and professional pursuits in the digital age."	3.47	Strongly Agree
11.	I am pleased to see my child's enthusiasm for learning and problem-solving cultivated through their engagement with robotics lessons	3.60	Strongly Agree
	Weighted Mean	3.47	Strongly Agree

Note: 3.01-4.00-Strongly Agree, 2.01-3.00-Agree, 1.01-2.00-Disagree, 0.00-1.00- Strongly Disagree.

Parents appreciated the robotics class was that it exposed also kids to cutting-edge technology and ground-breaking tools (Drigas *et al.*, 2023). In today's world, mastery of technology is progressively becoming essential hence the automation class familiarized young learners with programming, electronics, and mechanics too early in their lives (Haleem *et al.*, 2022). However, Raynal *et al.* (2022) the guardians saw it as a platform for igniting the interest of their offspring in technology while still enabling them to acquire skills applicable in their latter days.

The teaching strategies used in the robotics class are appreciated as well as effective for the parents (see **Table 5**). They think that teachers are smart, interesting, and skilled at making difficult ideas clear. Second, it suggests that parents think their kids are getting a lot out of the robotics program—valuable programming, engineering, and problem-solving abilities. Thirdly, it might show how happy students are with the general learning environment, including the tools and assistance offered. All things considered, the strong consensus among parents indicates that they all think the robotics program is giving their kids an outstanding education and developing critical skills for their future.

Yilmaz *et al.* (2021) said that many parents know that students who have some kind of practical skills and technical knowledge learned in the course have better chances than others. Yannier *et al.* (2020) showed that the hands-on experience and technical expertise that children acquire while taking part in the course gives them an added advantage over other children. Whether it is making applications for advanced educational programs, internships, or employment opportunities, there is an assurance that these robotics kids have higher chances of making it.

Table 5. Composite table on the assessment of parents on teaching and learning robotics class.

Criteria	Mean	Verbal Interpretation
Teaching	3.57	Strongly Agree
Learning	3.47	Strongly Agree
Weighted Mean	3.51	Strongly Agree

Note: 3.01-4.00-Strongly Agree, 2.01-3.00-Agree, 1.01-2.00-Disagree, 0.00-1.00- Strongly Disagree.

DOI:
p- ISSN: 2828-4887 e- ISSN: 2828-4860

3.2. Performance of Learners

Table 6 shows the results from the performance of learners. It may indicate that they are driven to work even harder and be more committed to their studies by a strong basic desire to succeed academically. Second, they probably have good study techniques, such as time management, organization, and active participation in the content. Thirdly, learners are much more likely to succeed if their teachers, classmates, and maybe even their families provide them with support and encouragement. Furthermore, the students could have access to outstanding learning resources and enrichment possibilities that improve their knowledge and knowledge of the topic.

Table 6. Performance of learners in subject area.

Performance	Mean	Verbal Interpretation
English	92.89	Outstanding
Math	91.59	Outstanding
Science	93.19	Outstanding
Weighted Mean	92.55	Outstanding

Note: Outstanding-90-100; Very Satisfactory-85-89; Satisfactory-80-84; Fairly Satisfactory-75-79; Did Not Meet the Expectations-74-below.

The reason why students excel in their major subjects is because they're super engaged and naturally curious. They're not just sitting there and absorbing information; they actively participate in class discussions, ask thought-provoking questions, and dig up extra resources to expand their understanding. By taking this proactive approach to education, they're able to dive deeper into their studies and apply what they've learned in practical and creative ways (Speldewinde, 2020). Their curiosity pushes them to explore subjects beyond what's covered in the curriculum, satisfying their intellectual thirst. This level of engagement and inner drive is a major factor in their academic success and sets them up for a lifetime of continuous learning (Bowden *et al*., 2021).

3.3. Significant Relationship of Robotics Lessons to Performance of Learners

Table 7 shows the relationship between robotic lessons and the performance of learners. While parents' views on the quality of instruction are crucial for understanding their viewpoints, other factors may have a greater impact on student performance. These aspects could include learners' drive, engagement with the subject, teaching effectiveness, and support from the educational institution. As a result, while parental evaluation gives useful information, it may not always be a good predictor of student achievement in robotics classes.

According to Drigas *et al.* (2023), parents view teaching robotics as extremely valuable because it sets their children up for success in both academics and future careers. Not only does it provide them with essential cognitive, social, and technological skills, but it also offers them engaging and enjoyable learning experiences (Zeng *et al*., 2020). This well-rounded skill set is seen as crucial for thriving in the modern world and beyond.

Table 8 shows the relationship between the performance of learners and the assessment of parents in learning in robotics. Though parents could have views on how well their child is learning robotics, these views might not always line up with the students' real accomplishments in the school. Parents may not always appropriately assess the efficiency of instructional strategies, the children's unique learning styles, or their involvement with the topic, among other reasons. Therefore, although they are useful for comprehending parental

DOI:
p- ISSN: 2828-4887 e- ISSN: 2828-4860

viewpoints, parental evaluations might not always be accurate measures of student achievement in robotics programs.

Robotics provides numerous educational benefits. However, some parents might not fully grasp its importance when compared to traditional academic subjects (Relkin et al., 2020). This could be due to a perceived disconnect, a lack of integration, or a focus on more traditional academic priorities (Michelson *et al*., 2021). Additionally, Butchart (2021) said that the perceived complexity of robotics and a lack of familiarity with its benefits could contribute to this perception. Furthermore, the immediate impact of robotics on other subjects may not be readily visible to parents. Nonetheless, it's important to recognize and appreciate the value of robotics in education (Evripidou *et al*., 2020).

Table 7. Relationship of performance of learners and assesment of parents in teaching in robotic class.

Criteria	r-value	Significance	Ho	Verbal Interpretation
Performance of Learners Assessment of Parents Teaching	0.02	0.74	Failed to reject	Not significant

Legenda = 0.05

Table 8. Relationship of performance of learners and assessment of parents in learning in robotics.

Criteria	r-value	Significance	Ho	Verbal Interpretation
Performance of Learners Assessment of Parents in Learning	0.07	0.38	Failed to reject	Not significant

Legenda = 0.05

4. CONCLUSION

Based on the analysis and interpretation of the data, several key findings have emerged. Firstly, parents show strong agreement on the value of Teaching and Learning Robotics Classes. Secondly, learners demonstrate outstanding performance across various subject areas. Lastly, there appears to be no significant relationship between teaching methods and learning outcomes in terms of the academic performance of learners. Based on the findings, the following conclusions are drawn: Parents have been satisfied with the robotics class in school, learners showed enthusiasm and commitment to their subjects taken, and parents do not directly affect learner's performance in robotics class. Based on the findings and conclusions drawn, the following recommendations are offered engage parents in the learning experience of the learners in the robotics class, provide additional worksheets that enhance the skills of learners, and encourage parents to communicate with teachers about any areas where they feel their child could further excel.

5. ACKNOWLEDGMENT

This research followed the ethical considerations in conducting research. This is a product of pioneering research in elementary grade at Ianthe Christian Academy in the Philippines.

6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

6. REFERENCES

Ayeni, O. O., Unachukwu, C. C., Al Hamad, N. M., Chisom, O. N., and Adewusi, O. E. (2024). The impact of robotics clubs on K-12 students' interest in STEM careers. *Magna Scientia Advanced Research and Reviews*, *10*(1), 361-367.

Bowden, J. L. H., Tickle, L., and Naumann, K. (2021). The four pillars of tertiary student engagement and success: a holistic measurement approach. *Studies in Higher Education*, *46*(6), 1207-1224.

Butchart, J., Harrison, R., Ritchie, J., Martí, F., McCarthy, C., Knight, S., and Scheinberg, A. (2021). Child and parent perceptions of acceptability and therapeutic value of a socially assistive robot used during pediatric rehabilitation. *Disability and rehabilitation*, *43*(2), 163-170.

Cameron, L. (2020). A robot took my job! How STEM education might prepare students for a rapidly changing world. *Curriculum Perspectives*, *40*(2), 233-239.

Carstens, K. J., Mallon, J. M., Bataineh, M., and Al-Bataineh, A. (2021). Effects of Technology on Student Learning. *Turkish Online Journal of Educational Technology-TOJET*, *20*(1), 105-113.

Chevalier, M., Giang, C., Piatti, A., and Mondada, F. (2020). Fostering computational thinking through educational robotics: A model for creative computational problem solving. *International Journal of STEM Education*, *7*, 1-18.

Drigas, A., Papanastasiou, G., and Skianis, C. (2023). The school of the future: The role of digital technologies, metacognition and emotional intelligence. *International Journal of Emerging Technologies in Learning (Online)*, *18*(9), 65.

Dwivedi, Y. K., Ismagilova, E., Hughes, D. L., Carlson, J., Filieri, R., Jacobson, J., ... and Wang, Y. (2021). Setting the future of digital and social media marketing research: Perspectives and research propositions. *International journal of information management*, *59*, 102168.

Evripidou, S., Georgiou, K., Doitsidis, L., Amanatiadis, A. A., Zinonos, Z., and Chatzichristofis, S. A. (2020). Educational robotics: Platforms, competitions and expected learning outcomes. *IEEE Access*, *8*, 219534-219562.

Haleem, A., Javaid, M., Qadri, M. A., and Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable operations and computers*, *3*, 275-285.

Janssen, T. W., Grammer, J. K., Bleichner, M. G., Bulgarelli, C., Davidesco, I., Dikker, S., ... and van Atteveldt, N. (2021). Opportunities and limitations of mobile neuroimaging technologies in educational neuroscience. *Mind, Brain, and Education*, *15*(4), 354-370.

Kyprianou, M., Dakou, K., Aktar, A., Aouina, H., Behbehani, N., Dheda, K., Juvelekian, G., Khattab, A., Mahboub, B., Nyale, G., Oraby, S., Sayiner, A., Shibl, A., El Deen, M. A. T., Unal, S., Zubairi, A. B. S., Davidson, R., and Giamarellos-Bourboulis, E. J. (2023).

Macrolides for better resolution of community-acquired pneumonia: A global meta-analysis of clinical outcomes with focus on microbial aetiology. *International Journal of Antimicrobial Agents*, *62*(4), 106942.

Lin, C., Šabanović, S., Dombrowski, L., Miller, A. D., Brady, E., and MacDorman, K. F. (2021). Parental acceptance of children's storytelling robots: A projection of the uncanny valley of AI. *Frontiers in Robotics and AI*, *8*, 579993.

Michelson, R., DeWitt, A., Nagar, R., Hiniker, A., Yip, J., Munson, S. A., and Kientz, J. A. (2021). Parenting in a pandemic: Juggling multiple roles and managing technology use in family life during COVID-19 in the United States. *Proceedings of the ACM on Human-Computer Interaction*, *5*(CSCW2), 1-39.

Mukherjee, D., Gupta, K., Chang, L. H., and Najjaran, H. (2022). A survey of robot learning strategies for human-robot collaboration in industrial settings. *Robotics and Computer-Integrated Manufacturing*, *73*, 102231.

Ouyang, F., and Xu, W. (2024). The effects of educational robotics in STEM education: A multilevel meta-analysis. *International Journal of STEM Education*, *11*(1), 1-18.

Raynal, A., Lavigne, H., Goldstein, M., and Gutierrez, J. (2022). Starting with parents: Investigating a multi-generational, media-enhanced approach to support informal science learning for young children. *Early Childhood Education Journal*, *50*(5), 879-889.

Relkin, E., Govind, M., Tsiang, J., and Bers, M. (2020). How parents support children's informal learning experiences with robots. *Journal of Research in STEM Education*, *6*(1), 39-51.

Sapounidis, T., and Alimisis, D. (2020). Educational robotics for STEM: A review of technologies and some educational considerations. In *Science and mathematics education for 21st century citizens: Challenges and ways forward* (No. September, 2020, pp. 167-190). Hauppauge, NY, USA: Nova Science Publishers.

Speldewinde, C. (2022). STEM teaching and learning in Bush Kinders. *Canadian Journal of Science, Mathematics and Technology Education*, *22*(2), 444-461.

Talib, C. A., Aliyu, H., Aliyu, F., Maimun, A., Malik, A., Anggoro, S., and Ali, M. (2020). Integration of robotics into STEM education for facilitating environmental sustainability. *Solid state technology*, *63*(1), 767-783.

Yannier, N., Hudson, S. E., and Koedinger, K. R. (2020). Active learning is about more than hands-on: A mixed-reality AI system to support STEM education. *International Journal of Artificial Intelligence in Education*, *30*, 74-96.

Yilmaz Ince, E., and Koc, M. (2021). The consequences of robotics programming education on computational thinking skills: An intervention of the Young Engineer's Workshop (YEW). *Computer Applications in Engineering Education*, *29*(1), 191-208.

You, H. S., Chacko, S. M., and Kapila, V. (2021). Examining the effectiveness of a professional development program: integration of educational robotics into science and mathematics curricula. *Journal of science education and technology*, *30*(4), 567-581.

Zeng, J., Parks, S., and Shang, J. (2020). To learn scientifically, effectively, and enjoyably: A review of educational games. *Human Behavior and Emerging Technologies*, *2*(2), 186-195.

DOI:
p- ISSN: 2828-4887 e- ISSN: 2828-4860

Zhao, H., Hu, S., Zhang, H., Wang, Z., Dong, H., Del Hougne, P., Cui, T. J., and Li, L. (2023). Intelligent indoor metasurface robotics. *National Science Review*, *10*(8), nwac266.

DOI:
p- ISSN: 2828-4887 e- ISSN: 2828-4860