

Assessing the Impact of Arduino Programming Training on Socioeconomic Status and Livelihood Improvement among Grade 12 Respondents: A Comprehensive Analysis

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Abstract

This research explored the impact of Arduino programming training on the socioeconomic status and livelihood improvement of Grade 12 students. The study employed a mixed-methods approach, including surveys and interviews, to assess the perceived effects of the training. The findings demonstrate that Arduino programming training positively influenced the socioeconomic status of students, leading to increased employment opportunities, income generation, and entrepreneurial prospects. The acquired programming skills facilitated the development of innovative solutions to community challenges, enhancing economic stability. Additionally, the training contributed to diversification in occupational choices and expanded income streams, ultimately empowering the students and fostering sustainable socio-economic development. These findings highlight the significance of incorporating Arduino programming training in the curriculum to equip students with essential skills for success in a technology-driven society.

Introduction

In today's rapidly evolving world, technological advancements have become indispensable for individuals seeking to enhance their socioeconomic status and secure sustainable livelihoods. Among these technological developments, Albatish et al (2018) posit that Arduino programming has emerged as a powerful tool, empowering individuals with the ability to create innovative solutions and bridge the gap between theory and application. This is particularly true in educational settings, wherein providing Arduino programming training to students, such as those in Grade 12, offers a promising avenue for fostering essential skills and capabilities that can positively impact their future prospects.

The objective of this research was to conduct a comprehensive analysis of the impact of Arduino programming training on the socioeconomic status and livelihood improvement of Grade 12 respondents. It aimed to assess the effectiveness of capability building initiatives centered around Arduino programming, understanding how they contributed to the respondents' overall well-being and opportunities for socioeconomic advancement.

Basarmak (2021) postulates that the socioeconomic status of individuals play a vital role in determining their access to resources, opportunities, and overall quality of life. By equipping Grade 12 respondents with Arduino programming skills, this research sought to evaluate whether such training led to tangible improvements in their socioeconomic status. This included exploring

potential benefits such as increased employment prospects, income generation, entrepreneurial opportunities, and the ability to leverage technology for addressing community challenges.

Furthermore, livelihood improvement according to (Organtini, 2018), which encompasses the means by which individuals secure their daily needs and sustain themselves and their families, is another crucial aspect of this research. By examining the impact of Arduino programming training on the respondents' sources of livelihood, the study aimed to identify potential shifts in income streams, diversification of occupational choices, and the extent to which the acquired skills contributed to enhancing their overall economic stability.

To achieve these research objectives, a mixed-methods approach was employed, combining quantitative surveys to measure the perceived impact of Arduino programming training on socioeconomic status and qualitative interviews to gather in-depth insights into the experiences and outcomes of the Grade 12 respondents. The research findings provided valuable insights for educational institutions, policymakers, and stakeholders interested in leveraging Arduino programming training as a means to empower students and foster sustainable socio-economic development.

Overall, this research aimed to shed light on the potential benefits of Arduino programming training among Grade 12 students, illuminating its role in enhancing their socioeconomic status, livelihood opportunities, and overall well-being. By understanding the impact of capability building initiatives centered around Arduino programming, more effective educational strategies that equip students with the skills and knowledge necessary to thrive in an increasingly technology-driven world, can be paved.

Methodology

This research followed a mixed-methods approach to comprehensively investigate the impact of Arduino programming training on the socioeconomic status and livelihood improvement of Grade 12 students. Quantitative surveys were conducted to gather data on the perceived impact of the training, measuring factors such as employment prospects and income generation. Qualitative interviews provided deeper insights into the experiences and outcomes of the participants, allowing for a more nuanced understanding of the influence of Arduino programming on their livelihood sources. The combination of quantitative and qualitative data provided a comprehensive analysis of the research objectives.

Research Design and Instrument

The subsequent discussion describes the instruments utilized in this paper.

Quantitative Surveys: The surveys were designed to gather data on the perceived impact of Arduino programming training on the socioeconomic status and livelihood improvement of Grade 12 students. These surveys consisted of structured questions that assessed various factors such as employment prospects, income generation, and overall socioeconomic well-being. The

surveys were administered to a sample of Grade 12 students who had undergone Arduino programming training, with the USTP trainers. The participants were asked to provide their responses based on their experiences and observations.

Qualitative Interviews: The qualitative interviews aimed to gather in-depth insights and narratives from a subset of participants. These interviews were conducted with a selected group of Grade 12 students who had completed the Arduino programming training. The interviews followed a semi-structured format, allowing for flexibility and exploration of individual experiences and outcomes. The participants were encouraged to share their personal stories, challenges, successes, and the impact of the training on their sources of livelihood. The qualitative interviews provided a deeper understanding of the nuances and subjective perspectives of the participants.

Both the surveys and interviews were conducted in a manner that ensured participant privacy and confidentiality. The survey responses were collected anonymously to encourage honest and unbiased feedback. In the interviews, participants' identities were kept confidential, and the data collected was used for analysis and reporting purposes only. The combination of quantitative surveys and qualitative interviews provided a comprehensive and multidimensional view of the impact of Arduino programming training on the socioeconomic status and livelihood improvement of Grade 12 students.

The Respondents

The participants of the study were the USTP trainers involved in the 2019 Arduino programming for beginners' training. This was also inclusive of the thirty-six Graders who served as respondents in the training from Lapasan National High School. As the study was conducted during the COVID-19 pandemic, they were reached out via facebook, group chats and zoom video conferencing.

The Data Gathering Procedure

The data gathering procedure for this research involved administering structured quantitative surveys to Grade 12 students who underwent the Arduino programming training, collecting data on variables such as socioeconomic status and employment prospects. In addition, qualitative interviews were conducted with the selected group of participants to obtain in-depth insights into their experiences and the impact of the training on their livelihood sources. The survey data was analyzed using statistical methods, while thematic analysis was applied to the interview transcripts. The integration of quantitative and qualitative data provided a comprehensive understanding of the research objectives, ensuring confidentiality and privacy for participants and contributing to a deeper understanding of the impact of Arduino programming training on socioeconomic status and livelihood improvement.

Results and Discussion

The results of this research provide valuable insights into the impact of Arduino programming training on the socioeconomic status and livelihood improvement of Grade 12 students. Both quantitative surveys and qualitative interviews were conducted to gather data and provide a comprehensive analysis.

Quantitative survey results indicated that Arduino programming training had a positive influence on the socioeconomic status of the participants. Participants reported increased employment prospects, with a significant portion securing positions related to technology and programming. This highlights the relevance and market demand for individuals with Arduino programming skills. Additionally, respondents reported an improvement in income generation, including opportunities for freelancing and entrepreneurship. These findings suggest that Arduino programming training equips Grade 12 students with valuable skills that enhance their economic stability and potential for socioeconomic advancement. The table that follows summarizes these.

Table 1. The Training's Influence on the Respondents N=36

Number of Responses	Socio-Economic Impact	Type of Impact	
		Positive	Negative
30	Increased employment prospects	√	
36	Secure positions for technology and programming	√	
25	Market demand	√	
15	Improvement in income generation	√	
29	Opportunities for freelancing and entrepreneurship	√	

Qualitative interview findings further enriched the understanding of the impact of Arduino programming training on livelihood sources. Participants shared their experiences of applying their acquired programming skills to develop innovative solutions to community challenges. This demonstrated the practical utility of Arduino programming training and its potential to contribute to livelihood improvement. The interviews also revealed a diversification in occupational choices, with respondents incorporating technology-related fields into their career paths. Accordingly, this diversification expanded their income streams and enhances their resilience in an evolving job market. Similarly, the research of Arslan & Tanel (2021) revealed similar results. The study indicated that the qualitative interviews unveiled a notable diversification in occupational choices among the research participants, as they incorporated technology-related fields into their career paths.

The integration of quantitative and qualitative findings yielded a comprehensive understanding of the research objectives. The data indicated that Arduino programming training provides Grade 12 students with valuable skills that positively impact their socioeconomic status and livelihood opportunities. In consonance with the paper of Alam (2020), the training equipped them for employment in technology-related fields and empowered them to pursue entrepreneurial ventures. Moreover, the acquired skills enabled them to address community challenges, leading to a more sustainable and holistic approach to livelihood improvement.

These findings have significant implications for educational institutions and policymakers. The results highlight the importance of incorporating Arduino programming training in the curriculum to prepare students for the technology-driven job market and foster their socioeconomic advancement. The training did not only equip students with technical skills but also fostered problem-solving abilities, innovation, and entrepreneurship.

Conclusions and Recommendations

This research provides compelling evidence of the positive impact of Arduino programming training on the socioeconomic status and livelihood improvement of Grade 12 students. The findings demonstrate that Arduino programming training equipped students with valuable skills that enhance their employment prospects, income generation, and entrepreneurial opportunities. The integration of quantitative survey data and qualitative interview narratives revealed a comprehensive understanding of the benefits of Arduino programming training. The research highlighted the importance of incorporating such training initiatives into educational curricula to prepare students for the demands of a technology-driven society.

Moreover, the research findings shed light on the diversification in occupational choices resulting from Arduino programming training. Participants demonstrated a willingness to explore technology-related fields, expanding their career options beyond traditional pathways. This diversification enhanced their income streams and strengthens their resilience in an evolving job market. This further emphasized the importance of promoting a multidisciplinary approach to education that combines technical skills with problem-solving abilities and innovation, fostering well-rounded individuals capable of addressing community challenges.

The implications of this research extend beyond the individual level, as the socioeconomic benefits of Arduino programming training have broader implications for community development and sustainable socio-economic growth. By equipping the Grade 12 trainee-respondents with Arduino programming skills, educational institutions and policymakers can contribute to empowering individuals, fostering entrepreneurship, and addressing societal challenges through technology-based solutions. Future research should explore the long-term effects of Arduino programming training and consider strategies for scaling and sustaining these initiatives to maximize their impact on students' lives and communities.

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