

Sustainable Education for Refugee Children: A Quasi-Experimental Study

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ABSTRACT

Refugee children are unable to access formal education like public schools due to their status with no citizenship. According to sustainable development goals (SDGs), everyone should have equal access to formal education. Objective: This study aimed to evaluate the effectiveness of sustainable education programmes for refugee children. Method: An educational programme was provided to refugee children by using a quasi-experimental approach with 27 refugee children for a period of 1 year. The program consisted of teaching sessions in four subjects: Malay language, mathematics, Islamic lessons, and science. Pre- and post-program assessments were used to measure changes in the children's learning outcomes. Significant improvements were observed across all subjects. Malay language competency increased, with 36% of younger children and 44% of older children able to vocalize more than five alphabets post-program. In mathematics, all children could count from 1-10 post-program, with 80% mastering basic arithmetic. Islamic knowledge also improved, with 90% of children able to recite Surah Al-Fatihah correctly. In science, 75% of children could identify body parts accurately. The results indicate that structured educational interventions can significantly enhance the learning outcomes of refugee children. Future programs should focus on sustaining these efforts through partnerships and improving teacher training.

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1. INTRODUCTION

Education is a fundamental human right that is essential to moulding an individual's destiny while supporting sustainable development. Globally, refugee children are among the most vulnerable populations, often facing educational disparities due to their legal status, financial constraints, and limited resources [1]. The fourth Sustainable Development Goal (SDG) of the United Nations (UN) highlights the importance of providing

inclusive, equitable, high-quality education to all, especially marginalized groups like refugees. However, there are other obstacles that refugee children have to conquer in order to receive a formal education, especially in host nations where their status as refugees prevents them from being fully integrated into the public school system [2]. For example, Malaysia is not a signatory to the 1951 Refugee Convention, which limits the enrollment of refugee children in public schools. As a result, these children frequently depend on underfunded, inadequately resourced community-based learning facilities [3].

A study stated that education is essential to a refugee child's integration into host communities and to giving them the tools they need to start over [4]. However, the majority of refugee children do not receive a formal education because of legislative and policy restrictions, which restrict their ability to develop both personally and economically. Research indicates that refugees who obtain education and vocational training are more likely to favourably impact their host communities and have better career opportunities [1]. Community-based education initiatives have surfaced as an approach of addressing the issue of refugee children's limited access to formal education. Local communities, religious organizations, and non-governmental organizations (NGOs) frequently lead these initiatives. These programs can teach fundamental literacy and numeracy skills, but they have a number of obstacles to overcome, such as sporadic funding, a teacher shortage, and a paucity of instructional resources [3].

Empirical studies have demonstrated that refugee children's academic performance, social integration, and psychological well-being significantly increase when they participate in structured educational programs, even in non-formal settings [3] to [4]. However, the sustainability of resources and the participation of local populations are frequently prerequisites for the success of these initiatives. For instance, some community schools in Malaysia that receive funding from international organizations such as the United Nations High Commissioner for Refugees (UNHCR) offer basic resources and textbooks, but these initiatives fall short of what is needed to satisfy the increasing demand for education among the population of refugees [5]. Fostering resilience, critical thinking, and life skills that can assist them in overcoming the difficulties of displacement is an essential part of sustainable education for children of refugees, in addition to teaching them the fundamentals of literacy [6].

In order to ensure environmental integrity, economic viability, and a just society for both the present and future generations, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) says that education for sustainable development (ESD) should equip students with the knowledge and skills they need to make informed decisions and take responsible actions [7]. Including culturally appropriate education that fosters social cohesion and personal growth in addition to academic courses is necessary for educating refugee children. Refugee children lack the fundamental life skills reading, numeracy, and comprehension that are required for a prosperous future since they have restricted access to formal education [5]. The absence of organized, long-lasting educational programs in refugee communities continues to be a major obstacle, despite the fact that education is essential for their social integration and future support.

Therefore, this study aims to investigate the possibility of community-based education in enhancing learning results for refugee children by putting in place an organized learning curriculum that concentrates on important subjects including science, mathematics, Islamic studies, and the Malay language. This study's quasi-experimental methodology enables pre- and post-program comparisons to evaluate how well the program promotes educational equity for populations of refugees.

2. RESEARCH METHOD

Study design

This study used a quasi-experimental design to evaluate the effectiveness of a structured educational program for Rohingya refugee children in Kampung Darat Sungai Ular, Pahang Malaysia. The intervention was implemented over a one-year period, with pre- and post-program assessments used to measure the impact of the program on the children's learning outcomes in four key subjects: Malay language, mathematics, Islamic studies, and science. The teaching methods included interactive activities, games, and assessments tailored to the children's age and literacy levels.

Study Setting

This study was conducted at a community center (Dewan) in Kampung Darat Sungai Ular, Balok, Pahang, a location where a significant population of Rohingya refugee families resides. This community center was selected as the site for educational activities due to its accessibility and the presence of a supportive local community. The program was implemented in collaboration with local volunteers and community leaders.

Participants

A total of 27 Rohingya refugee children between the ages of 2 and 13 participated in the study. The participants were selected using convenience sampling based on the availability and willingness of their families to allow them to attend the educational program. The inclusion criteria for the participants were children aged 2

to 13 years, residing in the refugee community in Kampung Darat Sungai Ular, not currently enrolled in any formal educational institutions.

Intervention

A structured educational program was implemented as an intervention to enhance the children's reading, numeracy, religious knowledge, and fundamental scientific comprehension. The course covered the following four topics:

Malay Language: Emphasis on fundamental literacy abilities, such as reading, writing short sentences, and vocalizing alphabets.

Basic mathematics: It was covered, including addition, subtraction, counting from 1 to 10, and comprehending money.

Islamic Lessons: Centered on religious instruction, which includes memorizing Surah Al-Fatihah, learning how to offer prayers (solah), and comprehending basic Islam principles.

Science: Focused with the five senses, body parts, and the ability to discriminate between living and non-living objects.

Over the course of one year, there were two monthly 1.5 hour educational sessions. Interactive exercises like group projects, games, songs, and visual aids were all part of the instructional strategies. Each subject had three teachers assigned to it, with extra assistant teachers helping to oversee the class and offer one-on-one assistance as needed.

Data Collection

Data were collected through pre- and post-intervention assessments, focusing on the children's performance in the four subjects taught during the program.

Pre-Program Assessment: Prior to the start of the intervention, baseline data on the children's knowledge and skills in Malay language, mathematics, Islamic studies, and science were collected. The assessment was conducted through oral questioning, written quizzes (for older children), and practical demonstrations of religious practices.

Post-Program Assessment: At the end of the program, the children were re-assessed using the same methods to determine the impact of the educational intervention. Improvements in literacy, numeracy, religious knowledge, and scientific understanding were recorded.

Research instrument

We used the "toolkits for community groups: promoting the well-being of migrants and displaced persons" to carry out this study [8]. This toolkit was created for communities that want to celebrate diversity in experiences and cultures while also working to promote wellbeing and inclusivity. For assessing each of the subject's achievement, we used the checklist based on the content of the intervention. For instance;

Malay Language: Children were assessed on their ability to recognize and vocalize alphabets, as well as their ability to form simple words or sentences.

Basic mathematics: Assessments focused on counting, addition, subtraction, and understanding the value of money.

Islamic Studies: Children's ability to recite Surah Al-Fatihah and perform solah was assessed through practical demonstrations.

Science: Children were asked to identify body parts, the five senses, and classify living versus non-living things.

The assessment checklists were developed to suit the children's age and literacy levels. For younger children, the assessments were mostly oral or practical in nature, while older children completed written exercises.

Data Analysis

Descriptive statistics were used to assess the data from the pre- and post-program periods. To describe categorical data (e.g., the ability to vocalize alphabets or perform solah), frequencies and percentages were employed. To find out if the children's performance had improved statistically, paired sample t-tests were used to compare the mean scores of the pre- and post-program assessments among the four participants.

Ethical Consideration

This study received ethical approval from the IIUM Research Ethics Committee (IREC) [IREC 2024-167]. Before the children could take part in the program, their parents or guardians had to give their written, informed consent. Throughout the whole programme, the participants' confidentiality and identities were preserved. Participation was voluntary, and families were informed that they could withdraw their children from the program at any time without consequence.

3. RESULTS AND DISCUSSIONS

In this study, there are a total of 27 refugee children including 15 males and 12 females participated in the intervention programmes. Their age ranged from 2 years to 13 years. The sociodemographic characteristics of the studied participants are described in [Table 1](#).

Table 1. Sociodemographic Characteristics of the Participants

Variables	Frequency (n = 27)	Percentage (%)
Gender of Children		
Male	15	55.6
Female	12	44.4
Age Group (years)		
2 - 7	14	51.9
8 - 13	13	48.1
Religion		
Islam	27	100
Household Income (RM)		
< 1000	10	37.0
1000 – 2000	12	44.4
> 2000	5	18.5
Main Occupation of Parents		
Self-employed	21	77.8
Unemployed	6	22.2

The following session describes pre- and post-intervention programme findings for all four subjects.

Pre- and Post-Program Assessment Results

Shows the ability of children to vocalize Malay alphabets before and after the intervention in [Table 2](#).

Table 2. Malay Language

Age Group	Pre-Program: Less than 5 Alphabets	Pre-Program: More than 5 Alphabets	Post-Program: Less than 5 Alphabets	Post-Program: More than 5 Alphabets
2 - 7 years	4 (16%)	9 (36%)	1 (4%)	13 (48%)
8 - 13 years	1 (4%)	11 (44%)	0 (0%)	13 (48%)

Pre-Program Observation: A majority of the children aged 8-13 years could vocalize more than 5 alphabets, but younger children (2-7 years) struggled.

Post-Program Results: Significant improvement was seen, with 48% of children in both age groups vocalizing more than 5 alphabets.

Significant improvements were seen across both age groups. The structured language lessons, supported by music and interactive activities, helped to familiarize the children with the Malay alphabet. More than 50% of the children showed an increase in their ability to vocalize the alphabets and construct simple sentences. [Table 3](#) demonstrates the children's ability to perform basic arithmetic operations before and after the program.

Table 3. Basic Mathematics

Mathematics Skills	Pre-Program (%)	Post-Program (%)
Counting 1-10	70.4%	100%
Addition/Subtraction	44.4%	80%
Counting Money	37.0%	56%

Pre-Program Observation: A small percentage of children could count money or perform addition and subtraction.

Post-Program Results: The program helped 80% of the children improve their basic arithmetic skills, including counting and performing simple operations.

Few children could perform basic arithmetic, especially addition and subtraction. 80% were able to count from 1-10, but only 56% could understand basic money counting. Following the lessons, all children were able to count from 1-10, and 80% were proficient in addition and subtraction. The ability to count money improved significantly, with 56% of the children grasping this concept post-intervention. **Table 4** compares the children's ability to recite Surah Al-Fatihah and perform solah before and after the intervention.

Table 4. Islamic Practices

Islamic Practices	Pre-Program (%)	Post-Program (%)
Recitation of Surah Al-Fatihah	50%	90%
Full Solah Performance	20%	50%

Pre-Program Observation: Only 50% of children could recite Al-Fatihah correctly, and even fewer (20%) could perform all the solah steps.

Post-Program Results: The program substantially improved religious knowledge, with 90% reciting Al-Fatihah correctly and 50% able to perform all solah steps.

The children had a basic knowledge of Islamic practices, but only 50% could perform the solah (prayer) steps correctly. By the end of the program, 90% of the children could recite Surah Al-Fatihah correctly, and 50% could perform all the solah steps. This was a marked improvement from the pre-program stage, where fewer children had adequate knowledge of Islamic rituals. **Table 5** shows the children's performance in classifying body parts, identifying the five senses, and distinguishing between living and non-living things.

Table 5. Science

Science Skills	Pre-Program (%)	Post-Program (%)
Classification of Body Parts	50%	75%
Identifying Five Senses	40%	55.6%
Living vs Non-living Classification	50%	70%

Pre-Program Observation: Children had basic knowledge of science concepts, but many struggled with identifying senses and body parts.

Post-Program Results: Improvements were observed in all areas, with 75% of the children demonstrating good classification skills after the intervention.

Across all subject areas, the educational program resulted in substantial improvements in the children's performance, particularly in language proficiency, mathematics, religious practices, and basic science knowledge. The children had minimal understanding of body parts, the five senses, and the difference between living and non-living things. 75% of the children demonstrated good classification skills related to body parts, and 55.6% could identify the five senses correctly without assistance. **Table 6** represents a significant improvement in their ability to classify and understand scientific concepts.

Table 6. Paired Sample T-test Results for Pre- and Post-Program Assessments

Subject	Pre-Program Mean (M)	Post-Program Mean (M)	Mean Difference (ΔM)	t	p-value
Malay Language	2.5	4.5	2.0	5.23	< 0.0001
Mathematics	3.0	6.0	3.0	6.11	< 0.0005
Islamic Studies	2.8	5.2	2.4	4.85	< 0.0002
Science	3.2	5.5	2.3	5.01	< 0.0001

*p-value <0.001 is significant

Most children demonstrated minimal proficiency in the Malay language. Of the children aged 2-7, only 16% could vocalize fewer than five alphabets, while 36% vocalized more than five. Among the older group (8-13 years), 44% vocalized more than five alphabets, with just one child struggling to vocalize fewer than five.

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Discussions

The results of this study show that formal educational interventions can greatly enhance the learning outcomes of children who are refugees, especially in core areas like science, math, language, and Islamic studies. This conversation examines the ramifications of these findings and contrasts them with the body of knowledge already available on refugee schooling.

Impact of Educational Interventions

The children's increased ability in the Malay language is consistent with earlier studies that highlight the importance of language for social integration. For refugees, language proficiency is essential since it allows them to interact with locals and obtain public services like healthcare and education [3]. Our research demonstrates that following the intervention, children of different ages (2–7 years) and (8–13 years) showed notable improvements in their vocalization of the Malay alphabet, suggesting that even a brief educational program can make a significant difference in language acquisition. This result aligns with the findings of a previous study who emphasized the value of early schooling in enhancing the social and economic opportunities for children of refugees [4]. The children's arithmetic proficiency in fundamental counting, addition, subtraction, and money management improved significantly.

Just 60% of the kids could count from 1 to 10 before the program, and even fewer could do simple math problems or computations with money. After completing the program, every child could count from 1 to 10, 80% could add and subtract, and 56% could count money. These results imply that teaching strategies that are participatory and contextually relevant such as employing real-world examples like counting money can significantly improve the practical numeracy abilities of children who are refugees. Research highlighting the significance of numeracy for daily survival and economic involvement lends credence to this [1].

Enhancing Islamic Education

The children's increased proficiency in performing solah and reciting Surah Al-Fatihah emphasizes how important culturally appropriate schooling is to helping refugee children retain their religious identity. Just 50% of the kids could accurately recite the surah and only 30% could correctly perform solah in the pre-program exam. 90% could recite the surah and 50% correctly performed solah after the program. This improvement is consistent with research on Islamic education, which indicates that religious education is crucial for Muslim refugee children's emotional and spiritual health because it gives them a sense of identity and belonging in a strange place [9]. Incorporating religious lessons into the program not only enhanced the children's comprehension of Islamic customs but also aided in the development of a routine a critical component of stability and adaptability in refugee environments.

Scientific Knowledge and Critical Thinking

Gains in science, especially in the areas of body parts, the five senses, and the classification of living and non-living objects, show that kids can understand the fundamentals of science when they are taught in an interesting and practical way. Research has demonstrated that, even with their interrupted schooling, refugee children are motivated to learn and capable of succeeding academically in formal learning settings [2]. By the end of the training, 75% of the children in this study could correctly identify bodily parts, and by the end of the program, 55.6% of them could correctly identify the five senses. This aligns with previous studies highlighting the value of integrating science instruction into refugee programs and teaching lifesaving skills to school-age children to foster critical thinking and curiosity as well as the lifelong ability and motivation of young people to take action in emergencies [10] to [11].

Challenges and Areas for Improvement

Even while the program had some excellent results, there were a few issues that came up. The children's low attention spans, especially in younger age groups, were one of the primary problems. According to earlier research, younger students may find it difficult to concentrate throughout lengthy class periods, particularly in areas like mathematics that call for a lot of concentration [12]. Furthermore, some of the kids still faced difficulties due to language challenges, especially the ones who had limited previous exposure to Malay. This implies that future initiatives should incorporate language support customized to meet the unique requirements of every child, as emphasized by a previous study, who highlights the volunteers' lack of prior teaching expertise presented another challenge [1]. Despite the program's success, a large number of the volunteer teachers lacked professional teaching experience.

This probably made it more difficult for them to keep the kids engaged throughout class and to properly run the classroom. Research has shown that in refugee environments, inexperienced instructors frequently face difficulties managing the classroom [13]. Future treatments may be more effective overall if volunteers received more in-depth training or if professional instructors were hired. Significance of differentiated instruction in educational environments for refugees.

Implications for Future Programs

The study's findings highlight how crucial it is to put in place long-term educational initiatives for children of refugees. In addition to enhancing academic achievement, educational interventions are essential for

refugee populations' social, emotional, and cultural integration [1]. Going forward, the viability and scalability of these projects will depend on collaborations with local communities and non-governmental organizations (NGOs). Research indicates that family engagement can considerably improve the learning outcomes of refugee children, making parent involvement in the educational process even more important [12]. In addition, studies also advised that future programs incorporate vocational and technical skills training to provide refugee children with the necessary abilities to find jobs and make a positive contribution to their communities [3] to [4].

4. CONCLUSIONS AND RECOMMENDATION

This study shows how structured educational interventions can help Rohingya refugee children achieve better learning outcomes. Significant advancements were made in the fields of science, religion, numeracy, and language learning. Nonetheless, issues with teacher preparation, attention spans, and language obstacles still exist. Future initiatives should concentrate on improving parent involvement, preparing teachers, and guaranteeing long-term sustainability through collaborations with local government and non-profit organizations. Moving forward, there is a need to refine the project execution by conducting multiple teaching sessions spread over longer periods. Future programs should also consider more creative teaching approaches to sustain the children's interest. A well-established education centre could serve as a permanent solution to ensure continuous learning for these children.

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