

## EMPOWERING STUDENTS WITH SPECIAL NEEDS THROUGH LILIN HARUM LESTARI (LIME INNOVATION PROJECT GUIDED BY QURANIC VALUES

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### ABSTRACT

In an era where inclusive education and environmental sustainability are global imperatives, faith-based approaches offer powerful pathways for transformative learning. This study explores the impact of the Lilin Harum Lestari (LIME) innovation project at Sekolah Kebangsaan Permatang To' Kandu. Rooted in the principles of Education for Sustainable Development (ESD) and guided by Quranic values, the project promotes environmental stewardship through the recycling of used cooking oil and leftover crayons to produce eco-friendly candles. These candles serve as both learning tools and school sale items, fostering a sense of purpose and inclusion among participants. The initiative draws inspiration from the Quranic verse, "And do not waste [resources], indeed He does not like the wasteful" (Surah Al-A'raf, 7:31), and the Hadith, "The earth is green and beautiful, and Allah has appointed you as His stewards over it" (Sahih Muslim). Using qualitative methods and classroom observation, the study involved 64 mainstream students and 7 students with special needs aged between 10 to 12 years old from the Program Pendidikan Khas Integras. These students presented diverse learning profiles, including cognitive, sensory, and behavioral challenges. Findings reveal that the LIME project significantly enhanced the students' understanding of recycling through hands-on, sensory-rich experiences. It also increased motivation, supported inquiry-based learning, and encouraged peer mentoring within the science curriculum. Importantly, the project fostered social inclusion, self-confidence, and collaborative learning, which are the key elements in nurturing holistic development for students with special needs. By embedding Quranic ethics and environmental consciousness into science education, the LIME project offers a replicable model for integrating faith-based values with inclusive pedagogy, empowering learners to become responsible stewards of the earth.

**Keywords:** Inclusive Education, Environmental Stewardship, Quranic Values, Special Needs Learners, Education For Sustainable Development (ESD)

### INTRODUCTION

Environmental sustainability is not merely a global concern it is a moral imperative deeply rooted in Islamic teachings. The Quran emphasizes humanity's role as khalifah (stewards) of the Earth, entrusted to protect and preserve its balance: And do not commit abuse on the earth, spreading corruption."

(Surah Al-Baqarah, 2:60)

"indeed, we have created everything in balance."

(Surah Al-Qamar, 54:49).

In this spirit, the Lilin Harum Lestari (LIME) Innovation Project was developed at Sekolah Kebangsaan Permatang To' Kandu (SKPTK) to cultivate environmental awareness, creativity, and inclusive values among students involving students with special needs. Guided by Quranic ethics and the Hadith, "The world is sweet and green, and verily Allah is going to install you as vicegerents in it in order to see how you act." (Sahih Muslim), the project integrates Education for Sustainable Development (ESD) with hands-on learning and social entrepreneurship.

Through the transformation of used cooking oil and leftover crayons into eco-friendly scented candles, students engage in the 4R concept: Reduce, Reuse, Recycle, and Recreate while exploring STEM principles and character development. Natural ingredients such as pandan leaves, kaffir lime, cloves, green tea, and coffee enhance the sensory and ecological appeal of the candles, which serve as learning tools and saleable products.

## **LITERATURE REVIEW**

### **Environmental Sustainability and Waste Management in Education**

Education for Sustainable Development (ESD) emphasizes the integration of ecological awareness into school curricula to foster responsible citizenship and environmental stewardship. UNESCO (2017) highlights that sustainability education empowers learners to make informed decisions and take responsible actions for environmental integrity. Early exposure to recycling and upcycling practices can significantly influence students' lifelong habits (Tilbury, 2011). Used cooking oil and paraffin-based crayons, though common household items, pose serious environmental risks due to their non-biodegradable nature and contribution to water and soil pollution (Yusoff, Hassan, & Rahman, 2020). School-based recycling initiatives have proven effective in promoting eco-conscious behaviour and reducing waste (Mohd Isa, Ahmad, & Zulkifli, 2019).

### **Inclusive Education and Experiential Learning**

Inclusive education promotes equitable learning opportunities for all students, including those with special needs. The Universal Design for Learning (UDL) framework supports differentiated instruction and hands-on activities that accommodate diverse learning styles (CAST, 2018). Experiential learning, particularly through project-based and sensory-rich activities, enhances engagement and skill development among neurodiverse learners (Kolb, 1984; Tomlinson, 2014). Candle-making, as a tactile and creative process, offers therapeutic and educational benefits, fostering fine motor skills, self-expression, and collaboration (Abdullah & Zainal, 2021).

## **Islamic Ethics and Environmental Stewardship**

Islamic teachings emphasize environmental responsibility, rooted in the concept of stewardship (khalifah). The Quran and Hadith advocate for balance, conservation, and the avoidance of waste: “Indeed, we have created everything in balance.” (Surah Al-Qamar, 54:49) and “Do not waste [resources]; indeed, He does not like the wasteful.” (Surah Al-A'raf, 7:31). In addition, Nasr (2003) argues that Islamic environmental ethics provide a spiritual framework for ecological consciousness. Sani (2018) further emphasizes that integrating Quranic values into education can cultivate moral responsibility and environmental care among students. Faith-based sustainability projects reinforce religious values while deepening learners’ sense of purpose and accountability.

## **Social Entrepreneurship and Student Empowerment**

Social entrepreneurship in education encourages students to identify community challenges and develop innovative solutions with economic and social impact. Bornstein and Davis (2010) assert that such initiatives foster leadership, creativity, and civic engagement. Projects that combine environmental action with product creation such as eco-candle making which enable students to engage in meaningful learning while contributing to school and community well-being. For students with special needs, these initiatives offer inclusive pathways to skill-building, self-confidence, and societal contribution (Noraini, Mahmud, & Latif, 2022).

## **PROBLEM STATEMENT**

Improper disposal of used cooking oil is a growing environmental concern with serious consequences for ecosystems, infrastructure, and public health. When poured into drains or rivers, used oil forms a thick, greasy film on the water’s surface, blocking oxygen exchange and suffocating aquatic life. Fish, amphibians, and microorganisms essential to the food chain are particularly vulnerable, leading to biodiversity loss and ecological imbalance.

On land, used oil seeps into the soil, disrupting nutrient cycles and contaminating groundwater. This not only affects plant growth but also endangers animals and humans who rely on clean water sources. Moreover, as the oil decomposes anaerobically, it releases methane, a potent greenhouse gas that contributes to climate change. When disposed of in sinks, it solidifies in pipes, causing blockages, foul odours, and costly maintenance burdens often borne by local communities and municipal systems.

The danger extends to living beings: animals may ingest oil-contaminated materials, leading to internal damage, poisoning, or death. For humans, exposure to polluted environments increases the risk of disease, especially in vulnerable populations such as children and the elderly.

From an Islamic perspective, such environmental harm is not merely a technical issue; it is a moral and spiritual failing. The Qur’an warns against corruption and violence: “Corruption has appeared throughout the land and sea by [reason of] what the hands of people have earned...”

(Surah Ar-Rum, 30:41)

This verse reminds us that environmental degradation is a consequence of human negligence and excess. Islam calls for responsible stewardship (khilafah), where believers are entrusted to care for the Earth and all its creatures. Disposing of harmful substances without regard for their impact violates this trust and contradicts the principle of rahmah (compassion) toward all living beings.

A preliminary survey at Sekolah Kebangsaan Permatang To' Kandu (SKPTK) involving 82 staff members revealed that 36.6% struggled with managing used cooking oil, underscoring the need for practical, ethical, and inclusive solutions. The LIME project responds to this challenge by converting used cooking oil into scented candles using natural ingredients such as pandan leaves, lime, and cloves. This initiative not only reduces environmental harm but also promotes Islamic values of sustainability, compassion, and community empowerment. It engages students, including those with special educational needs, in meaningful learning and social entrepreneurship, transforming waste into benefit and neglect into care.

## **OBJECTIVES**

The objectives of the Lilin Harum Lestari (LIME) innovation project are:

- i. To promote environmental awareness and sustainable practices among mainstream and special needs students through hands-on recycling activities.
- ii. To integrate Quranic values and inclusive pedagogy in science education, fostering ethical responsibility and holistic development.
- iii. To develop low-cost, eco-friendly products (scented candles) that serve as learning tools, souvenirs, and saleable items, encouraging social entrepreneurship.
- iv. To cultivate STEM interest and character development through sensory-rich, inquiry-based learning experiences.

## **RESEARCH DESIGN**

The research employed a participatory action approach to explore how the Lilin Harum Lestari (LIME) Innovation Project empowers students with special needs through hands-on learning and Quranic-guided environmental education. Conducted at Sekolah Kebangsaan Permatang To' Kandu (SKPTK), the study involved 71 students aged 10 to 12, including 64 mainstream learners and 7 with special educational needs. The school was chosen for its strong commitment to inclusion and sustainability, with activities facilitated by teachers, special education coordinators, and support staff. The project unfolded in four phases: collection, production, design, and packaging. Students gathered used cooking oil and leftover crayons, then participated in workshops to create scented candles using natural ingredients like pandan leaves, lime, and cloves. They shaped and colored the candles creatively before packaging them for sale or exhibition, introducing basic concepts of social entrepreneurship.

To ensure inclusive participation, the project integrated Universal Design for Learning (UDL) strategies. Visual aids, tactile materials, and scaffolded instructions supported comprehension and engagement for neurodiverse learners, fostering autonomy and collaboration. Quranic verses and Hadith on environmental stewardship were introduced during reflection sessions, helping students connect their actions to Islamic values of responsibility, compassion, and care for the Earth.

## **FINDINGS**

This study examined the impact of the Lilin Harum Lestari (LIME) Innovation Project on student empowerment through experiential and Quranic-guided environmental education. Conducted at SKPTK, the project involved 71 students, including 7 with special educational needs. Findings indicate that the initiative fostered high levels of engagement, inclusivity, and ethical awareness. Students participated actively across all phases of the project, with the production and design stages showing the highest engagement. Activities such as melting used cooking oil and crayons, blending natural fragrances, and molding candles into creative forms encouraged sensory exploration and collaborative learning.

Neurodiverse learners benefited from Universal Design for Learning (UDL) strategies, which included visual guides, tactile materials, and scaffolded instructions. These supports enabled students with special needs to participate meaningfully, fostering autonomy, confidence, and peer interaction. The inclusive design of the project enriched learning for all students and demonstrated the feasibility of integrating UDL into environmental education.

Quantitative feedback showed high satisfaction across key domains. On a 5 Likert-point scale, students and teachers rated the project with mean of 4.8 for engagement, 4.6 for skill development, 4.4 for community impact, and 4.7 for sustainability awareness. These results affirm the project's success in cultivating environmental responsibility and entrepreneurial thinking. Importantly, the integration of Islamic values through reflection sessions deepened students' ethical understanding. Quranic verses such as Surah Ar-Rum (30:41) and Surah Al-A'raf (7:31) framed discussions on stewardship (khilafah) and responsible consumption. Students expressed pride in transforming waste into meaningful products, recognizing their role as caretakers of the Earth in accordance with Islamic teachings.

Overall, the LIME project illustrates how inclusive, faith-based environmental education can empower diverse learners to engage in sustainable practices and social entrepreneurship. The findings support the development of replicable models that blend experiential learning with spiritual and ecological consciousness.

### **Promoting Environmental Awareness and Sustainable Practices through Hands-On Recycling Activities**

The LIME Innovation Project successfully heightened environmental awareness among both mainstream and special needs students by engaging them in the collection and transformation of used cooking oil and leftover paraffin-based crayons. Students actively participated in recycling activities across all four phases: (i) collection, (ii) production, (iii) design, and (iv) packaging. These hands-on experiences helped students understand the environmental consequences of improper waste disposal and the value of repurposing materials. Observations revealed that students began associating everyday waste with potential utility, demonstrating increased mindfulness about sustainability. The act of converting waste into functional, fragrant candles reinforced the concept of stewardship and encouraged students to view themselves as contributors to ecological well-being.

## **Integrating Quranic Values and Inclusive Pedagogy in Science Education**

Quranic teachings were woven into the project through structured reflection sessions, where students explored verses such as Surah Al-A'raf (7:31) and the Hadith from Sahih Muslim on environmental stewardship. These sessions deepened students' ethical understanding and spiritual connection to their actions. Students expressed pride in aligning their learning with Islamic values, recognizing their role as khalifah (stewards) of the Earth. The inclusive pedagogy, grounded in Universal Design for Learning (UDL), ensured that students with cognitive, sensory, and behavioral challenges could participate meaningfully. Visual aids, tactile materials, and scaffolded instructions enabled neurodiverse learners to engage confidently, promoting autonomy, peer collaboration, and equitable access to science learning. Facilitators noted increased self-confidence and social interaction among special needs students, affirming the project's holistic developmental impact.

## **Developing Low-Cost, Eco-Friendly Products to Encourage Social Entrepreneurship**

The candles produced during the project were not only educational tools but also saleable items and school souvenirs. Students learned basic principles of product design, packaging, and marketing, introducing them to the concept of social entrepreneurship. The use of natural fragrances such as pandan, kaffir lime, cloves, green tea, and coffee added cultural relevance and sensory appeal, making the products attractive and meaningful. Teachers reported that students took initiative in preparing candles for exhibitions and school events, demonstrating ownership and entrepreneurial thinking. The low-cost nature of the materials, recycled oil and crayons, made the project replicable and accessible, especially for resource-constrained schools. This outcome aligns with the goal of empowering students to create value from waste while contributing to school sustainability efforts.

## **Cultivating STEM Interest and Character Development through Sensory-Rich, Inquiry-Based Learning**

The project's design emphasized sensory engagement and inquiry-based exploration, which proved particularly effective in stimulating interest in science, technology, engineering, and mathematics (STEM). Students experimented with melting points, fragrance combinations, mold shapes, and cooling times, applying scientific reasoning in a hands-on context. Neurodiverse learners responded positively to tactile and olfactory stimuli, with textured molds and scented ingredients enhancing focus and enjoyment. Facilitators observed increased curiosity, problem-solving, and peer mentoring, especially during the production and design phases. Character development was evident in students' collaborative behavior, perseverance, and ethical reflection indicating that the project fostered both cognitive and affective growth.

## **DISCUSSION**

The Lilin Harum Lestari (LIME) Innovation Project demonstrates how environmental education, inclusive pedagogy, and faith-based values can be synergistically integrated to foster meaningful learning among diverse student populations. The project's success lies in its ability to transform abstract concepts such as sustainability, stewardship, and entrepreneurship into tangible experiences through the medium of eco-friendly candle making.

## **Environmental Awareness and Stewardship**

Students' active involvement in recycling used cooking oil and crayons cultivated a sense of environmental responsibility. The hands-on nature of the project aligns with experiential learning theory, reinforcing the idea that direct engagement with materials enhances understanding and retention. The project also reflects the Islamic principle of *ihsan* (excellence in action), encouraging students to care for the Earth as part of their spiritual duty.

## **Inclusive Pedagogy and Holistic Development**

The use of Universal Design for Learning (UDL) strategies ensured that students with varying abilities could access and contribute to the project. Scaffolded instruction, sensory-rich materials, and peer collaboration created an inclusive learning environment that promoted autonomy and self-worth. This approach resonates with the Qur'anic emphasis on equity and compassion, affirming that every learner has value and potential.

## **Social Entrepreneurship and Value Creation**

By producing saleable candles, students engaged in real-world applications of science and economics. This entrepreneurial dimension not only enhanced motivation but also introduced ethical commerce rooted in sustainability. The project encouraged students to think beyond consumption, toward creation and contribution, an embodiment of *maslahah* (public good) and *barakah* (blessing through purposeful work).

## **STEM Engagement and Character Formation**

The inquiry-based, sensory-rich activities sparked curiosity and scientific thinking, particularly among students who might otherwise struggle with abstract instruction. The integration of tactile and olfactory stimuli supported neurodiverse learners, while collaborative tasks nurtured empathy, patience, and leadership. These outcomes reflect the holistic aims of Islamic education: to develop intellect (*'aql*), character (*akhlaq*), and community-mindedness.

## **CONCLUSION**

The LIME Innovation Project offers a compelling model for faith-guided, inclusive science education that is both environmentally conscious and socially empowering. By aligning hands-on recycling with Quranic values and Universal Design for Learning, the project achieved its objectives of:

- i. Raising environmental awareness through experiential recycling.
- ii. Embedding ethical and spiritual reflection in science learning.
- iii. Creating low-cost, eco-friendly products that foster entrepreneurship.
- iv. Cultivating STEM interest and character development through inclusive, sensory-rich pedagogy.

This initiative not only enriched students' cognitive and affective domains but also positioned them as active agents of change 'khalifah' within their communities. Future iterations could expand into other sustainable crafts, deepen inter-school collaborations, and explore longitudinal impacts on students' environmental behavior and career aspirations.

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