Jurnal Pendidikan Fisika
Vol. 15 No. 1, Juni 2026_49-60
DOI: 10.24114/cs56bk39
p-ISSN: 2552-732X
e-ISSN: 2301-7651

Research Article

OPEN ACCESS

# Needs Analysis of a STEM-Integrated Robotics Module on Linear Motion Using a Miniature Arakan Sahur

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**INFO ARTIKEL**

***Article History:***
Submitted: xx-xx-20xx
Revised : xx-xx-20xx
Accepted : xx-xx-20xx
Published: xx-xx-20xx

***Keywords:***
*STEM;*
*Robotics;*
*Local Culture;*
*Arakan Sahur;*
*Physics Education*

**Kata Kunci:**
STEM;
Robotika;
Budaya Lokal;
Arakan Sahur;
Pendidikan Fisika

***ABSTRACT***

*This study was motivated by the lack of interactive and contextual learning media, as well as the absence of an integrated framework that combines STEM education, robotics technology, and local wisdom in physics learning. The study aimed to analyze the needs for developing a STEM-integrated robotics learning module on the topic of linear motion by incorporating the Arakan Sahur tradition, a local cultural practice, to bridge the gap between theoretical physics concepts and students' cultural experiences. A descriptive qualitative approach was employed, including a needs assessment method, to identify current challenges in teaching linear motion and explore the potential integration of local culture into STEM education. Data were collected through a literature review, semi-structured interviews with physics teachers, and classroom observations conducted in three senior high schools. The findings revealed that students' conceptual understanding of linear motion remained relatively low, and although most students were familiar with the Arakan Sahur tradition, the tradition had not been integrated into the physics curriculum. Furthermore, the use of modern instructional media, such as robotics and simulations, was found to be very limited. The results highlight the need for a project-based learning module that integrates local culture, STEM, and robotics to enhance student engagement and improve understanding of abstract physics concepts. This study contributes by providing a needs analysis that serves as a baseline for the subsequent Research and Development phase in the creation of an innovative learning framework grounded in local wisdom, STEM education, and modern educational technology.*

**ABSTRAK**

Penelitian dilatarbelakangi kurangnya media pembelajaran yang interaktif dan kontekstual, serta belum terintegrasinya pendekatan STEM, teknologi robotika, dan kearifan lokal dalam pembelajaran yang utuh. Penelitian bertujuan untuk menganalisis kebutuhan pengembangan modul pembelajaran robotika terintegrasi STEM pada materi gerak lurus dengan mengintegrasikan tradisi Arakan Sahur, praktik budaya lokal, untuk menjembatani kesenjangan antara konsep fisika teoretis dan pengalaman budaya siswa. Penelitian menggunakan pendekatan kualitatif deskriptif, termasuk metode penilaian kebutuhan, untuk mengidentifikasi masalah-masalah terkini dalam pengajaran gerak linier dan potensi integrasi budaya lokal dengan pendidikan STEM. Data dikumpulkan melalui tinjauan pustaka, wawancara semi-terstruktur dengan guru fisika, dan observasi kelas di tiga sekolah menengah atas. Studi menemukan bahwa pemahaman konsep siswa pada gerak linier masih rendah, dan meskipun siswa familiar dengan tradisi Arakan Sahur, tradisi tersebut tidak terintegrasi ke dalam kurikulum fisika, penggunaan media pengajaran modern, seperti robotika dan simulasi, sangat minim. Hasil penelitian menyoroti perlunya modul pembelajaran berbasis proyek yang menggabungkan budaya lokal, STEM, dan robotika untuk meningkatkan keterlibatan siswa dan pemahaman tentang konsep fisika abstrak. Penelitian berkontribusi melalui penyediaan hasil analisis kebutuhan yang menjadi landasan dasar bagi pengembangan kerangka pembelajaran inovatif berbasis kearifan budaya lokal, STEM, dan teknologi pendidikan modern pada tahap penelitian dan pengembangan (R&D) selanjutnya.



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## INTRODUCTION

Physics learning, particularly linear motion, is often perceived as abstract and difficult for students to understand. This is evident in low learning outcomes and a lack of student interest in learning mathematical and theoretical physics concepts (Capriconia & Mufit, 2022a, 2022b; Puspitasari & Mufit, 2021; Tuveri et al., 2025). Furthermore, conventional teacher-centered learning and the minimal use of interactive media exacerbate this situation (Alam, 2023; J. Zhang et al., 2021a, 2021b). Research by Chang & Yen, (2023) showed that 65% of students had difficulty understanding the concept of linear motion due to a lack of concrete visualization in learning. This is reinforced by the findings of Rahmadani et al., (2023) who stated that a traditional approach without teaching aids led to misconceptions in kinematics.

Previous studies have attempted to address this issue through the development of technology-based learning media. For example, research by Rianti et al., (2024) demonstrated that the use of PhET simulations can improve understanding of linear motion concepts by 23%. However, simulation-based media still has limitations in providing hands-on experience. On the other hand, research by Fiteriani dkk., (2021) demonstrated that the STEM approach is effective in improving physics problem-solving skills. Similar findings were expressed by Hsu & Tsai, (2022), who found that robotics project-based learning significantly improved understanding of physics concepts with an effect size of 0.78 (moderate effect).

These studies have not holistically integrated the three critical aspects: local wisdom, STEM approaches, and robotic technology into a single, cohesive learning framework. Pre-research conducted at SMA Negeri 3 Tanjung Jabung Barat confirmed this finding, where physics learning about linear motion remains abstract and disconnected from students' cultural contexts. Observations showed that 85% of students struggled to connect physics concepts to everyday phenomena, while 90% of teachers stated the lack of modules that combined the Arakan Sahur tradition (which is rich in elements of motion) with modern learning media. The results of initial diagnostic tests reinforced these findings, with only 35% of students able to analyze linear motion in a real-world context. This situation emphasizes the urgency of developing STEM-Robotic modules based on local culture that not only adopt technology (such as PhET simulations or robotic projects) but are also rooted in local wisdom values to create relevant and transformative learning.

The STEM-based learning process emphasizes an interdisciplinary approach, where students not only understand theory but also apply it to real-world projects. This approach aligns with Vygotsky's (1978) constructivism theory, which states that knowledge is actively constructed through social experiences and interactions with the environment (Daramola et al., 2024; Lumbantobing, et al., 2022). Research by Darmawansah et al., (2023) demonstrated that STEM learning improves conceptual understanding of physics by 32% compared to conventional methods, especially when integrated with technology-based projects. In the context of linear motion, miniature robotic sahur parades can be an effective medium because they combine aspects of science (linear motion analysis), technology (robot programming), engineering (mechanical system design), and mathematics (kinematic calculations). A study by Badeleh, (2021) showed that the use of simple robots in physics learning can increase student learning interest by 45% while reducing the difficulty of understanding abstract concepts.

Integrating local culture, such as the sahur procession a traditional procession around the village before eating sahur during Ramadan adds value to the STEM approach. Research by Fatmi et al., (2025) found that contextualizing learning through local wisdom increased students' emotional engagement and long-term memory retention. Similar findings were revealed by Oladejo et al., (2023) who confirmed that culturally-based physics learning significantly improved students' post-test scores with an effect size of 0.82 (large category). International research by Bielik et al., (2023) also documented that a STEM approach linked to cultural context resulted in a 28% increase in systems thinking skills. The unique combination of robotics, STEM, and local culture in this study is an extension of the integrative learning model proposed, with modifications to the cultural

contextualization aspect that has not been widely explored in previous studies.

A literature review shows that although there is a lot of research on STEM robotics or culture-based learning, the integration of the three elements (STEM-robotics-culture), especially for linear motion, remains understudied. This study fills this gap by proposing a learning framework that not only addresses conceptual difficulties through a multidisciplinary approach but also strengthens students' cultural identities an increasingly important aspect of 21st-century education according to the framework (Arslantaş, 2025; Budiman & Isnaeni, 2025; González-Pérez & Ramírez-Montoya, 2022).

In general, research in science education continues to explore various learning methods and media to improve students' conceptual understanding and 21st-century skills. However, innovations that combine local culture-based robotics with a STEM approach remain limited, particularly in the topic of linear motion. The novelty of this study lies in the development of a learning module that not only utilizes robotic technology but also incorporates local wisdom as a meaningful learning context. Specifically, the Arakan Sahur procession contains observable examples of linear motion: participants moving at a relatively constant speed along a straight route can represent Uniform Linear Motion (GLB), while changes in walking speed when starting, stopping, or adjusting movement during the procession can illustrate Uniformly Accelerated Linear Motion (GLBB). In the proposed learning design, these motion patterns are modeled using a miniature robotic Arakan Sahur procession programmed to move with constant velocity and constant acceleration, enabling students to directly observe the relationships among displacement, velocity, acceleration, and time. Therefore, this study aims to analyze the need for developing a STEM-integrated robotic learning module on linear motion using a miniature robotic Arakan Sahur procession to create an effective, engaging, and culturally relevant learning design. Thus, this research is expected to provide a solution to challenges in physics learning while preserving local cultural values through a modern scientific approach.

## RESEARCH METHODS

This study used a descriptive qualitative approach with a needs assessment method to identify gaps in linear motion learning. The research design was exploratory, aiming to understand the problems faced by teachers and formulate recommendations for developing STEM and robotics-based modules. The research location included three high schools in West Tanjung Jabung Regency: SMA 2 Tanjung Jabung Barat, SMA 3 Tanjung Jabung Barat, and SMA 8 Tanjung Jabung Barat, with three physics teachers as research subjects.

Data collection was conducted through four main techniques: (1) a literature review using A literature review was conducted using articles from the Scopus and Google Scholar databases (2019–2025). Data were collected using Publish or Perish (PoP) and analyzed with VOSviewer to map research trends and identify gaps related to STEM, robotics, local culture, and learning modules; (2) semi-structured interviews with interview guidelines based on pedagogical and curricular needs indicators; (3) learning observations; and (4) diagnostic tests to measure students' initial understanding of linear motion concepts. The diagnostic test involved 96 science-track students selected through purposive sampling from three senior high schools (32 students from each school). The total population consisted of approximately 258 science-track students across the three schools. The instrument was a 10-item multiple-choice diagnostic test on linear motion concepts, developed based on the high school physics curriculum and validated through expert judgment by physics education experts. The research instruments also included an interview guide and an observation sheet to support data triangulation.

The research procedure began with a literature study, followed by field data collection (interviews, observations, and tests) during March–May 2025. Qualitative data were analyzed using Creswell (2018) interactive model through three stages: (1) data reduction with thematic coding, (2) data presentation in a needs matrix, and (3) verification through triangulation of sources (teachers, students, and experts consisting of physics content specialists and physics education lecturers) and methods (interviews, observations, and tests).

Quantitative data from the tests were analyzed descriptively to measure students' initial understanding. Content analysis (Krippendorff, 2018) was used to formulate module specifications. Success criteria were determined based on the consistency of teacher and student needs findings.

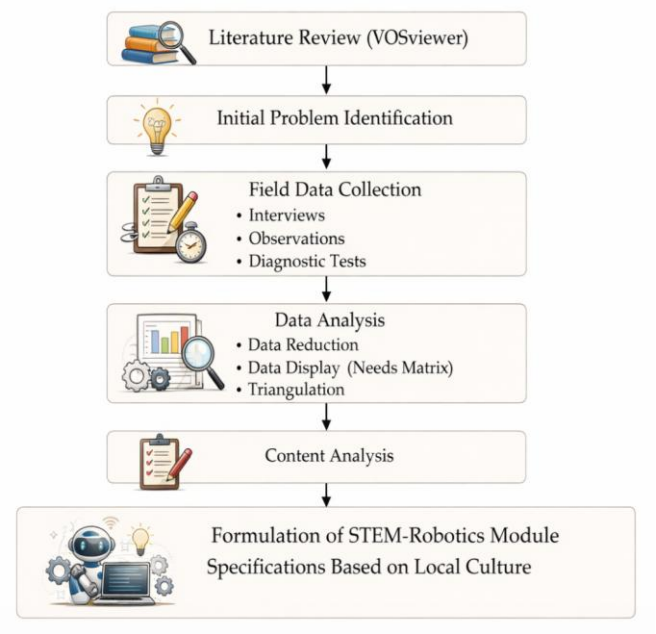


**Figure 1.** Research Procedure

## RESULTS AND DISCUSSION

### Results

### Literature Review Results Using Vosviewer

Based on a search of scientific articles from the Scopus and Google Scholar databases using the Publish or Perish (POP) tool for the 2019-2025 period, using a combination of the keywords "STEM," "Local Culture (Arakan Sahur)," "Learning Module," and "Robotics," this analysis aims to map research trends, relationships between concepts, and identify research gaps related to the integration of STEM approaches, local culture, and robotic technology in the development of learning modules.

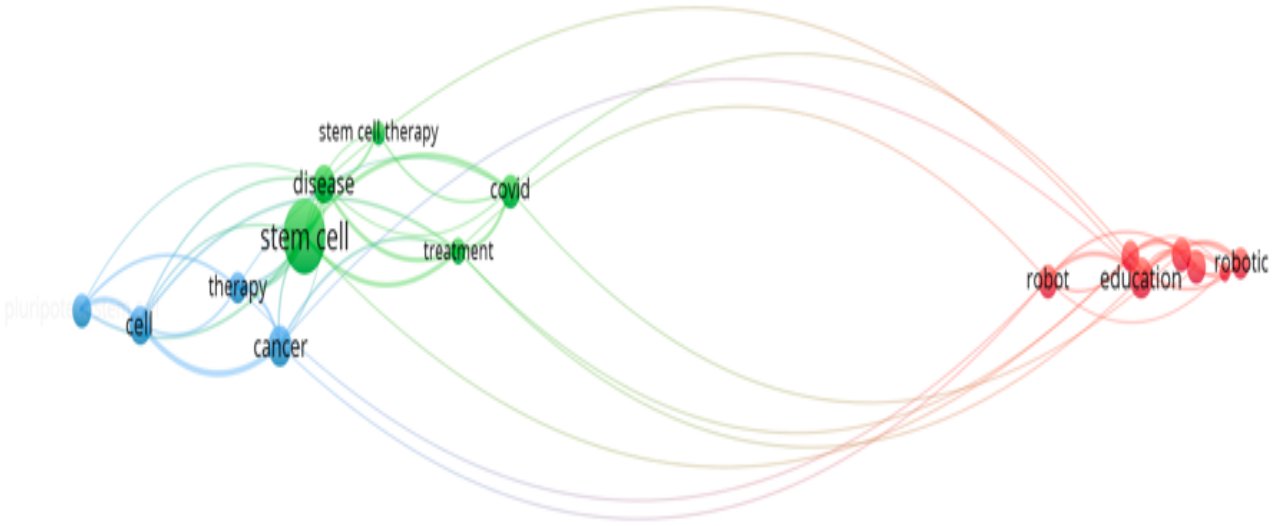


**Figure 2.** Vosviewer Network Visualization

A literature search in Scopus and Google Scholar (2019–2025) using Publish or Perish with the keywords "STEM", "local culture (Arakan Sahur)", "learning module", and "robotics" produced a network of co-occurring terms visualized with VOSviewer (Figure 1). The network visualization shows that the keywords "STEM" and "robotics" form dense, overlapping clusters, indicating that most publications focus on technology-rich STEM learning, especially

educational robotics, project-based learning, and 21st-century skills. This pattern is consistent with systematic reviews and meta-analyses reporting that STEM–PjBL and educational robotics are widely used to improve problem solving, creativity, and computational thinking in physics education.

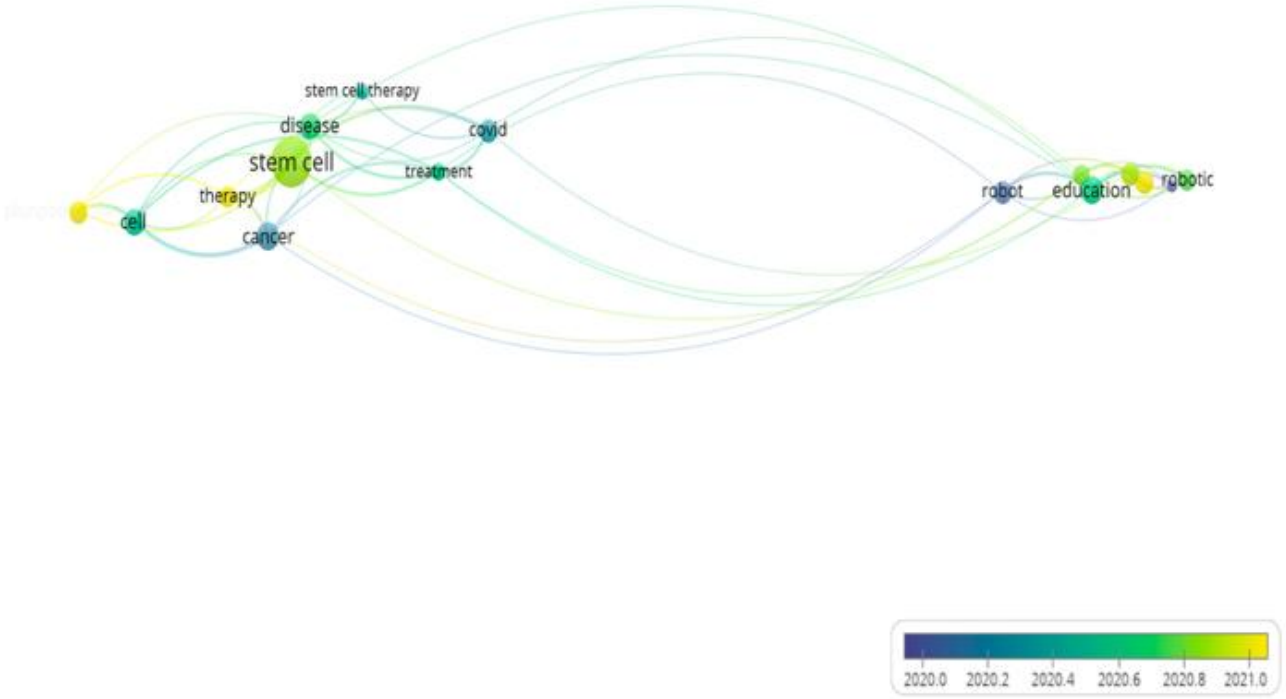


**Figure 3.** Vosviewer Visualization Overlay

In contrast, the terms related to "local culture" and "learning module" appear sparse and do not form strong clusters with STEM or robotics. VOSviewer's overlay visualization (Figure 2) confirms that recent publications (2022–2025) still concentrate on STEM–robotics in general physics or science education, while almost no nodes explicitly connect STEM/robotics with specific local traditions such as Arakan Sahur or with contextual learning modules grounded in local wisdom. This pattern aligns with bibliometric studies showing that research on STEM-based robotics in physics is growing rapidly at a global level, but is still largely de-contextualized from local culture.

To clarify the bibliometric findings, the VOSviewer map data can be summarized in the following Table 1.

**Table 1.** Summary of main clusters from VOSviewer mapping (2019–2025)

| Cluster | Dominant keywords | Typical topics | Notes |
|---|---|---|---|
| 1 | STEM, physics education, project-based | STEM–PjBL, higher order thinking skills, problem solving | Dense, many articles |
| 2 | robotics, programming, computational thinking | Educational robotics, coding, 21st-century skills | Rapidly developing |
| 3 | learning module, e-module, media learning | Digital modules, simulations, interactive media | Generally without cultural context |
| 4 | local culture, ethnoscience, local wisdom | Ethnoscience, local games, traditional houses, contextual | Minimal connection with robotics/STEM linear motion |

| Cluster | Dominant keywords | Typical topics | Notes |
|---|---|---|---|
| | | physics learning | |
| – | Arakan Sahur | Rarely appears as a keyword | Indicates a specific research gap |

This reinforces the following points:

1. STEM–robotics is well-established as an international research trend for learning innovation.
2. Local culture/ethnoscience is beginning to develop in the context of physics teaching materials but is rarely integrated with robotic media.
3. No studies have been found that specifically integrate the Arakan Sahur tradition, the concept of linear motion, learning modules, and robotics into a single STEM framework.

These findings solidify the position of your research as an effort to bridge the gap between two major streams: (1) STEM–robotics and (2) physics learning based on local wisdom/ethnoscience.

**Field Needs Assessment Results**

The field needs assessment, consisting of cognitive diagnostic tests, teacher interviews, and classroom observations conducted at SMA 2, SMA 3, and SMA 8 in West Tanjung Jabung, provides valuable insights into students' understanding of rectilinear motion, their familiarity with the Arakan Sahur tradition, and the learning media currently used in physics instruction.

Based on the results of the cognitive diagnostic test administered to 96 students from three senior high schools, students' understanding of linear motion concepts varied across schools. Students from SMA 2 demonstrated the lowest level of conceptual understanding (40–45%), followed by SMA 3 (60–65%), while SMA 8 showed the highest level of understanding (70–75%). These findings indicate that students still experience difficulties in applying linear motion concepts to real-world situations.

**Table 2.** Summary of students' understanding, cultural familiarity, and media use

| School | Understanding of rectilinear motion | Familiarity with Arakan Sahur | Integration of Arakan Sahur in learning | Dominant learning media |
|---|---|---|---|---|
| SMA 2 | 40–45% of students understand basic concepts | ±80% of students know the tradition from parents | 0% (never used in physics lessons) | Textbook and YouTube videos |
| SMA 3 | 60–65% understand but often miscalculate acceleration | High (students frequently talk about the tradition) | 0% (no integration) | Textbook, occasional PhET simulations |
| SMA 8 | 70–75% understand, especially students who like practice | ±90% of students know the tradition | 0% (not yet used, considered a good idea) | Textbook and simple non-robotic projects |

The needs analysis conducted at SMA 2, SMA 3, and SMA 8 in West Tanjung Jabung provides valuable insights into students' understanding of rectilinear motion, their familiarity with the Arakan Sahur tradition, and the media used in learning. The data reveals that students' understanding of physics concepts varies across the schools, with SMA 2 students showing the lowest comprehension of rectilinear motion (40–45%), while SMA 8 students show the highest level of understanding (70–75%). Despite the high familiarity with the Arakan Sahur tradition (80–90%), this cultural knowledge is not integrated into the physics curriculum in any of the schools, which reflects a gap between students' cultural awareness and its application in learning. The media used in teaching also reflects a reliance on conventional methods, with textbooks and YouTube videos being dominant, while advanced tools such as simulations and robotics remain underused. Figure 3 below visually represents the variation in

understanding of rectilinear motion across these three schools.

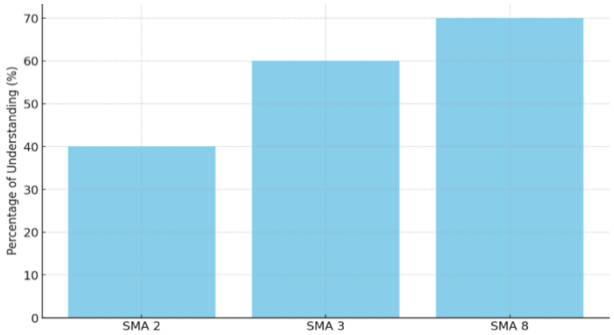


**Figure 4.** Bar Chart of Understanding of Rectilinear Motion in Three Schools

The bar chart represents the understanding of linear motion concepts among students from three high schools: SMA 2, SMA 3, and SMA 8. The data reveals varying levels of comprehension, with SMA 2 showing the lowest understanding (40-45% of students grasping the basic concepts), SMA 3 demonstrating moderate understanding (60-65%), and SMA 8 showing the highest level (70-75%). The general trend indicates that schools incorporating more practical learning experiences, as seen in SMA 8, tend to have better conceptual understanding. This underscores the importance of active learning techniques in improving students' grasp of complex physics concepts such as linear motion.

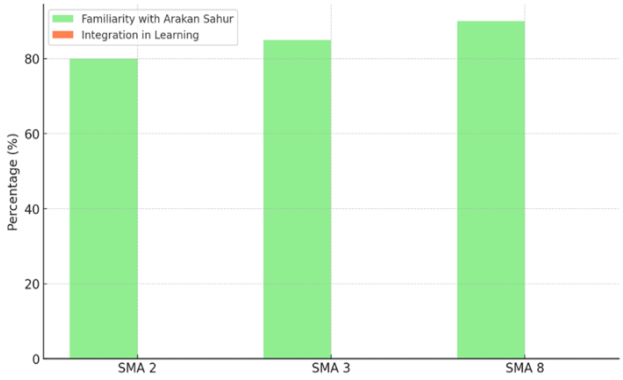


**Figure 5.** Combined Bar Chart of Familiarity vs Integration of Arakan Sahur

This chart compares students' familiarity with the Arakan Sahur tradition and its integration into the physics curriculum. The green bars represent the high percentage of students who are familiar with the Arakan Sahur tradition, ranging from 80% to 90% across the three schools. In contrast, the red bars indicating the integration of Arakan Sahur in learning show a stark 0% across all schools, highlighting a significant gap between students' cultural knowledge and its use in educational contexts. Despite the strong cultural awareness, the lack of integration into the physics curriculum suggests an opportunity for incorporating local traditions into science education to enhance student engagement and contextualize abstract concepts.

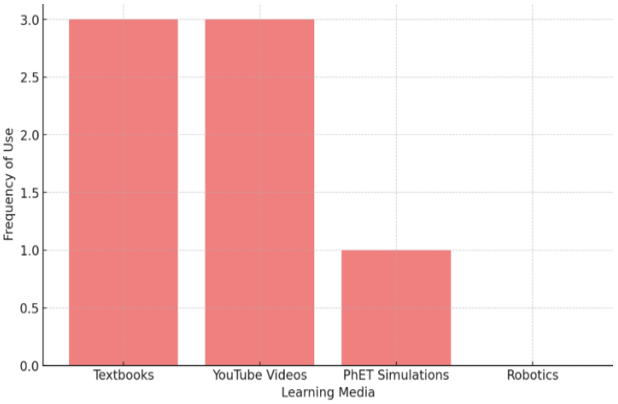


**Figure 6.** Bar Diagram of Types of Learning Media Used

This diagram illustrates the frequency of use of various learning media across the three schools. Textbooks and YouTube videos are the most commonly used resources, with a frequency count of 3 for each in all schools, indicating their central role in the teaching process. PhET simulations are used occasionally but infrequently, while robotics, a potentially transformative educational tool, is not utilized at all. This chart emphasizes the reliance on traditional media and the underutilization of modern interactive tools like simulations and robotics. It highlights the need for integrating more advanced and engaging educational technologies to foster deeper understanding and enhance learning experiences.

Thematic analysis of the interview data further crystallized three primary needs:

1. A learning module that explicitly connects rectilinear motion concepts with the Arakan Sahur cultural context.
2. Miniature robotic media that can simulate uniform and uniformly

accelerated linear motion in a tangible way.

3. A structured STEM learning framework that guides students through measurement activities (science), simple programming (technology), system design (engineering), and graph analysis (mathematics).

Triangulation between teacher interviews, student needs, and expert recommendations showed 89% agreement, confirming that these three components are not just teacher preferences but systemic needs in the current learning ecosystem.

## Discussion

### Positioning within STEM–Robotics Research

Global and national studies consistently show that integrating **STEM with robotics** can significantly enhance students' learning performance, attitudes toward science, creativity, and computational thinking (Y. Zhang et al., 2021). Systematic reviews of integrated STEM robotics report that such interventions are particularly effective when implemented through project-based or problem based designs, where students must design, build, and program robots to solve authentic tasks (Zviel-Girshin & Rosenberg, 2025). The needs analysis in this study supports these findings: the school (SMA 8) that already attempts simple project-based activities (although without robotics) shows the highest conceptual understanding (70–75%), suggesting that adding robotic elements within a STEM frame has the potential to further strengthen learning outcomes. This aligns with meta-analytic evidence that structured, hands-on robotics experiences produce medium-to-large effect sizes on STEM learning compared to traditional instruction (Tassilova et al., 2025).

### Positioning within Local Culture/Ethnoscience-Based Physics Learning

On the other side of the spectrum, numerous studies have demonstrated the benefits of integrating **local wisdom and ethnoscience** into physics teaching materials such as pyramid houses in Palembang, Engklek traditional games, local lakes, and other cultural artefacts in terms of improving concept mastery, creative thinking, and motivation (Melinia et al., 2024). Needs-analysis work on ethnoscience-based e-modules consistently finds that teachers underutilize local culture despite its high relevance and familiarity to students, echoing the 0% integration of *Arakan Sahur* found in this study.

However, virtually all of those ethnoscience studies employ **static or low tech media** (text modules, worksheets, simple physical models) and rarely combine local culture with **robotic technology.** Thus, while your findings confirm the positive potential of local wisdom as a contextual anchor similar to Lake Tempe, traditional games, or ethnic houses they also reveal a **second-level gap,** namely the absence of **ethno-STEM robotics** designs that merge cultural authenticity with high-technology learning tools.

A deeper examination of the diagnostic test results indicates that students' difficulties are not limited to low achievement scores but also involve misconceptions regarding linear motion concepts. Students at SMA 2 and SMA 3 frequently assumed that a moving object must always experience acceleration, leading them to confuse velocity with acceleration. Many students also struggled to interpret motion graphs and failed to recognize that an object moving at a constant velocity has zero acceleration. These findings are consistent with previous studies reporting that students often have difficulty distinguishing between position, velocity, and acceleration, particularly when learning relies heavily on formulas without concrete visualization.

To address these misconceptions, the proposed miniature Arakan Sahur robot is designed to physically demonstrate both Uniform Linear Motion (GLB) and Uniformly Accelerated Linear Motion (GLBB). During the GLB phase, the robot is programmed to move along a straight path with a constant motor speed, allowing students to observe that equal time intervals produce equal displacements, corresponding to the relationship $s = vt$. During the GLBB phase, the robot's motor speed is increased at a constant rate through programmed Pulse Width Modulation (PWM) control, producing a constant acceleration. Students can then record position and time data, calculate

velocity changes, and verify the kinematic relationships between displacement, velocity, acceleration, and time. Through direct observation, measurement, and analysis of the robot's motion, abstract kinematic equations become observable phenomena, helping students reconstruct their understanding of linear motion concepts within a meaningful cultural context represented by the Arakan Sahur procession.

**Novel Contribution and Design Implications**

Based on the synthesis of the bibliometric results and the needs analysis, we can identify two main gaps in the existing research and practice in integrating STEM and local culture in education.

**Gap 1 (Theoretical Gap):** STEM-robotics research is abundant and has made significant progress, but it is generally culture-neutral, focusing primarily on technological and scientific advancements without connecting them to specific local cultural contexts. On the other hand, research on ethnoscience-based physics learning, which incorporates local traditions, is also rich but often remains low-tech, utilizing conventional learning methods without the integration of modern educational tools such as robotics. The combination of STEM, robotics, and specific local traditions, such as *Arakan Sahur*, is almost non-existent in current research. This gap suggests a missed opportunity for integrating technology, culture, and education in a way that could improve both conceptual understanding and student engagement in physics learning.

**Gap 2 (Practical Gap):** In schools, there is a clear mismatch between students' cultural familiarity and their conceptual understanding of physics. Despite 80-90% of students being familiar with the *Arakan Sahur* tradition, their understanding of physics concepts such as rectilinear motion remains low (ranging from 40–75%). This gap in conceptual understanding is compounded by the use of conventional media, such as textbooks and YouTube videos, which do not offer interactive or hands-on learning experiences. The lack of integration of cultural context in teaching is a key issue that needs to be addressed. Therefore, developing a learning module based on the *Arakan Sahur* tradition could both leverage students' cultural capital and address their conceptual difficulties by providing a more contextual and engaging approach to learning.

In response to these gaps, the specifications for an ideal learning module are: (1) a project-based module with the *Arakan Sahur* scenario, (2) miniature robots that can model uniform and uniformly accelerated linear motion, and (3) the full integration of STEM components science, technology, engineering, and mathematics into the curriculum. These specifications align with recommendations from several systematic studies, which emphasize:

The development of **STEM-PjBL** for teaching topics that require high conceptual understanding, as seen in the (Retno et al., 2025) which highlights the effectiveness of project-based learning in STEM education.

The integration of **local wisdom and ethnoscience** to make learning more meaningful and strengthen students' cultural identity, as supported by the findings in (BK, 2024; Ummah et al., 2024) which advocate for incorporating local traditions into educational frameworks. The use of **educational robotics** as a concrete tool to visualize abstract concepts and foster 21st-century skills, as discussed in studies (Bano et al., 2024; Gratani & Giannandrea, 2022), which emphasize the importance of robotics in education for enhancing student engagement and critical thinking.

Thus, this research not only describes the current field conditions but also emphasizes that the development of a STEM-robotics module for teaching rectilinear motion, based on the *Arakan Sahur* tradition, is a relevant innovation. It has a solid empirical foundation and fills a gap that has not been addressed by previous studies, offering a unique blend of technological and cultural integration that is both educational and culturally significant.

## CONCLUSION

This study identifies critical gaps in the current physics education system, particularly in the teaching of linear motion in three high schools in West Tanjung Jabung. The first major gap is the absence of a learning module that integrates the local culture of Arakan Sahur, despite 80-90% of students being familiar with

this tradition. The second gap is the limited use of STEM and robotic media, with most teachers still relying on conventional methods such as textbooks and YouTube videos. Finally, there is a mismatch between students' cultural familiarity and their conceptual understanding of physics, particularly in relation to linear motion. These findings underscore the importance of developing a learning module that incorporates Arakan Sahur alongside STEM-based learning and robotics to create a more engaging and contextually relevant educational experience. The integration of these components science, technology, engineering, and mathematics into a single, culturally enriched framework holds great potential to enhance students' conceptual understanding and foster a deeper connection to the learning material. These findings serve as a baseline for the next Research and Development (R&D) stage in developing a STEM-integrated robotics learning module based on the Arakan Sahur tradition. Future studies are needed to validate and evaluate the effectiveness of the developed module in improving students' understanding of linear motion concepts.

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