

From Campus to Community: Enhancing Science Awareness and Interest Through Anatomy Outreach Programme for Secondary School Students in Kelantan

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ABSTRACT

Introduction: An Anatomy Outreach Programme (AOP) was conducted by the Department of Anatomy, Universiti Sains Malaysia at Falahiah Secondary School in Kelantan, Malaysia. The programme featured anatomical specimen exhibitions, interactive explanations, and a science-themed quiz aimed at enhancing science awareness and interest among secondary school students.

Methods: The event, attended by 340 students from 9 schools, provided first-hand exposure to human anatomy, promoting student engagement with biology and related sciences. Pre- and post- programme questionnaires was developed, distributed and evaluated diligently.

Results: Pre- and post-programme evaluations demonstrated significant improvements in students' science interest and anatomical knowledge, including a 33% rise in science interest and a 31% increase in basic anatomy understanding. The initiative also positively influenced students' motivation to pursue science-related studies in upper secondary levels.

Conclusion: Despite minor logistical constraints, the programme was well received and has the potential for replication across similar educational settings. It demonstrates how university-community partnerships can address educational disparities and foster early interest in science among underserved populations.

Keywords: anatomy; engagement; interest; outreach programme; science

INTRODUCTION

The advancement of science literacy and enthusiasm among youth is pivotal for fostering an innovative and knowledge-driven society. In Malaysia, disparities in science engagement between urban and rural secondary school students remain a concern, as rural students often have limited access to practical science activities¹. The Anatomy Outreach Programme (AOP) targeting secondary school students in Kelantan represents a strategic initiative aimed at bridging this gap. This write-up highlights the significance, outcomes, and future implications of this outreach, advocating for its replication and expansion.

Anatomy is a powerful tool for science outreach because it provides a universally relatable and visually engaging entry point into scientific learning, as every individual has a direct connection to their own body. This shared human experience enables anatomy to act as “a great unifier for human experience” facilitating meaningful public engagement². Its inherently visual and tactile nature through

anatomical models, prosected specimens, or digital simulations help capture students' attention and foster active participation, making complex concepts more accessible³. Moreover, anatomy bridges disciplines by linking biology, medicine, engineering, and art, while simultaneously promoting health literacy and personal relevance. These qualities make anatomy uniquely effective at sparking curiosity, facilitating interdisciplinary dialogue and empowering diverse audiences to engage meaningfully with science⁴.

Anatomy outreach programmes for school students around the world often blend hands-on, interactive programming with creative pedagogy designed to trigger curiosity and demystify complex bodily systems. For instance, global initiatives such as the American "Anatomy Nights"⁵, which pair brief public talks with live organ dissections in casual venues, embody programme formats that both educate and entertain young audiences while cultivating early engagement in biomedical sciences. Similarly, student-run "Anatomy Camp" programmes invite underserved middle and high schoolers to campus for experiential anatomy and wellness sessions, fostering accessible and informal learning environments⁶.

Pedagogically, innovative curricula harness pop culture icons such as superheroes to contextualize anatomical concepts in memorable, relatable frameworks, with students overwhelmingly reporting increased interest and effectiveness over traditional methods⁷. In Malaysia, outreach builds on institutional resources such as the programme organized by the Anatomy department, School of Medical Sciences, Universiti Sains Malaysia (USM) that combined clay anatomy models competition, exploration, and anatomy fun quiz to differentiate learning by age level⁸, while the AOP at NUMed Malaysia engaged the public through interactive activities utilizing anatomy models, 3D anatomy software, and body art painting competition⁹. These activities offered tactile engagement through preserved specimens, interactive stations, and public exhibits that blend awareness-raising with health literacy. Collectively, these global and Malaysian efforts illustrate a hybrid of programme design and imaginative, learner-centred teaching that together amplify the impacts of AOPs.

Kelantan, located in the north-eastern region of Peninsular Malaysia, is predominantly rural with a unique sociocultural landscape¹⁰. While the state boasts strong educational participation, access to interactive and hands-on science learning opportunities remains limited. The AOP, initiated by the Department of Anatomy, USM, brings academic resources and expertise directly to school communities, providing students with experiential learning that textbooks alone cannot offer¹¹. The AOP was conducted in conjunction with the Science, Technology, Engineering, and Mathematics (STEM) Carnival at Falahiah Secondary School in Kelantan, Malaysia. It was held on 20 May 2024, from 8:30 AM until 2:00 PM, at the main school hall. The programme was exceptionally well attended by a total of 340 students. The target audience was Form 1 to Form 4 students. The aim of the programme was to instil their awareness and interest in science education. In most secondary schools in Malaysia, students are allowed to choose a class stream in Form 4 ranging from pure science, computer science, accounting, and economics to art. Unfortunately, the current trend shows a decrease in students' interest in the science stream which might have a big impact on the country's future economic growth¹². Hence, this science carnival and anatomy outreach event were conducted to combat this challenge and promote students' interest in science through interactive activities.

METHOD

Preparation of the outreach programme

As preparation for the programme, 15 anatomical specimens were chosen based on school needs as per our discussion with the school representatives, that is, the biology and chemistry teachers. Figure 1 shows the type of prepared specimens, comprising the brain, eye, ear, heart, tongue, liver, skin,

muscle, head and neck, torso, upper limb, lower limb, stomach, and male and female reproductive organs. The specimens consisted of plastic anatomical models, plastinated prosections, or jar specimens. Each of the participating lecturers, science officers, and laboratory technologists was assigned to prepare a simple scientific description to be displayed with each specimen. Thus, each of the specimens was accompanied by an associated poster explaining its structures and functions. All staff members from the Anatomy Department, USM, contributed in preparing the materials and providing technical support in organising the event.

System	Model	Type of specimen
Nervous system	Brain	Plastic Model /Jar
Vision	Eye	Plastic Model
Hearing	Ear	Plastic Model
Cardiovascular	Heart	Plastic Model/Jar
Digestive System	Tongue	Plastic Model
Digestive System	Liver	Plastic Model/Jar
Integumentary	Skin	Plastic Model
Muscular	Muscle man	Plastic Model
Head & Neck	Head & Neck	Plastic Model/Plastinated
Musculoskeletal	Torso	Plastic Model
Digestive System	Stomach	Plastic Model
Female reproductive	Female reproductive	Plastic Model
Male reproductive	Male reproductive	Plastic Model
Embryology	Stages of pregnancy	Plastic Model

Figure 1: Type of Anatomy specimens or model prepared for Anatomy Outreach Programme

Programme structure and activities

The outreach programme employed a multifaceted approach, including interactive talks, hands-on anatomy demonstrations using models and specimens, and collaborative science experiments. This format aligns with pedagogical best practices which emphasize active learning and student engagement¹³. By demystifying complex biological concepts and making them tangible, the programme enhanced students' comprehension and interest in science subjects, particularly biology.

Implementation of AOP in Falahiah Secondary School

The programme was conducted in the form of an exhibition of anatomy specimens ranging from embryology to gross anatomy. For each specimen, its anatomical description was displayed to the students for their knowledge and understanding regarding human body structures. The lecturers from the Anatomy Department, USM, were also tasked with providing explanations to the students regarding the anatomical structures and functions as well as attending to their queries. The students were eagerly asking questions and listening to the explanations given by the anatomy lecturers from USM.

The students were also provided with the opportunity to participate in an anatomy fun quiz to test their curiosity and enthusiasm. Figure 2 shows that the students were excited to join the quiz and answer the prepared questions. They could refer to the written description prepared alongside the exhibited anatomical models.



Figure 2: A full house participation of students interested with the Anatomy exhibition and quiz

For some students, the event was their first exposure to various anatomical terminologies, organs, and their functions. They were fascinated to know about all those structures in their bodies. The event marked a full house attendance by the secondary school students from eight nearby institutions.

Apart from the students of Falahiah Secondary School, the event was also joined by a group of students from eight nearby schools. They were invited earlier by the organizer to join the event. The students and teachers from those schools were thrilled about the event and also showed interest in organising the event in their own schools in the near future.

RESULT

Regarding feedback mechanism, pre- and post-programme tests were developed to evaluate the following domains: interest level towards general science knowledge, level of self-knowledge on science, level of interest to enrol in science classes at Form 4 in secondary school, level of basic knowledge regarding anatomy, level of basic knowledge regarding functions of organs in human body, level of interest to explore on science and anatomy post programme, self-awareness regarding the importance of science, and self-motivation to learn anatomy. There were 113 respondents for both pre- and post-programme tests, and the results were analysed diligently.

An analysis of the effectiveness of the AOP at Falahiah Secondary School revealed notable improvements in students' knowledge, attitudes, skills, and aspirations related to science. The programme led to a significant 33% increase in students' interest in science, with the proportion of students rating their interest at levels 4 and 5 rising from 63% before the programme to 90% afterwards. Self-reported knowledge about science also improved by 43%, with high-level ratings increasing from 24% to 67%. Additionally, students' interest in enrolling in science classes at Form 4 rose by 11%, from 51% to 66%. Specific to anatomy, students demonstrated a 31% improvement in basic knowledge of anatomical terms, with high ratings climbing from 60% to 91%. Furthermore, there was a 5% increase in understanding the functions of major organs, with scores rising from an already high 92% to 97%. Overall, the majority of participating students reported feeling more interested in science and anatomy following the programme, underscoring its role in fostering enthusiasm and deeper engagement with scientific subjects.

Figure 3 shows the analysis of pre- and post-programme evaluation test as a proof that there was an increase in interest and awareness in science knowledge among students. This outcome is consistent with previous research indicating that early exposure to scientific practices can significantly shape students' academic and professional trajectories¹⁴. Students also reported increased interest in pursuing science-related studies and careers, particularly in healthcare and biomedical fields¹⁵.

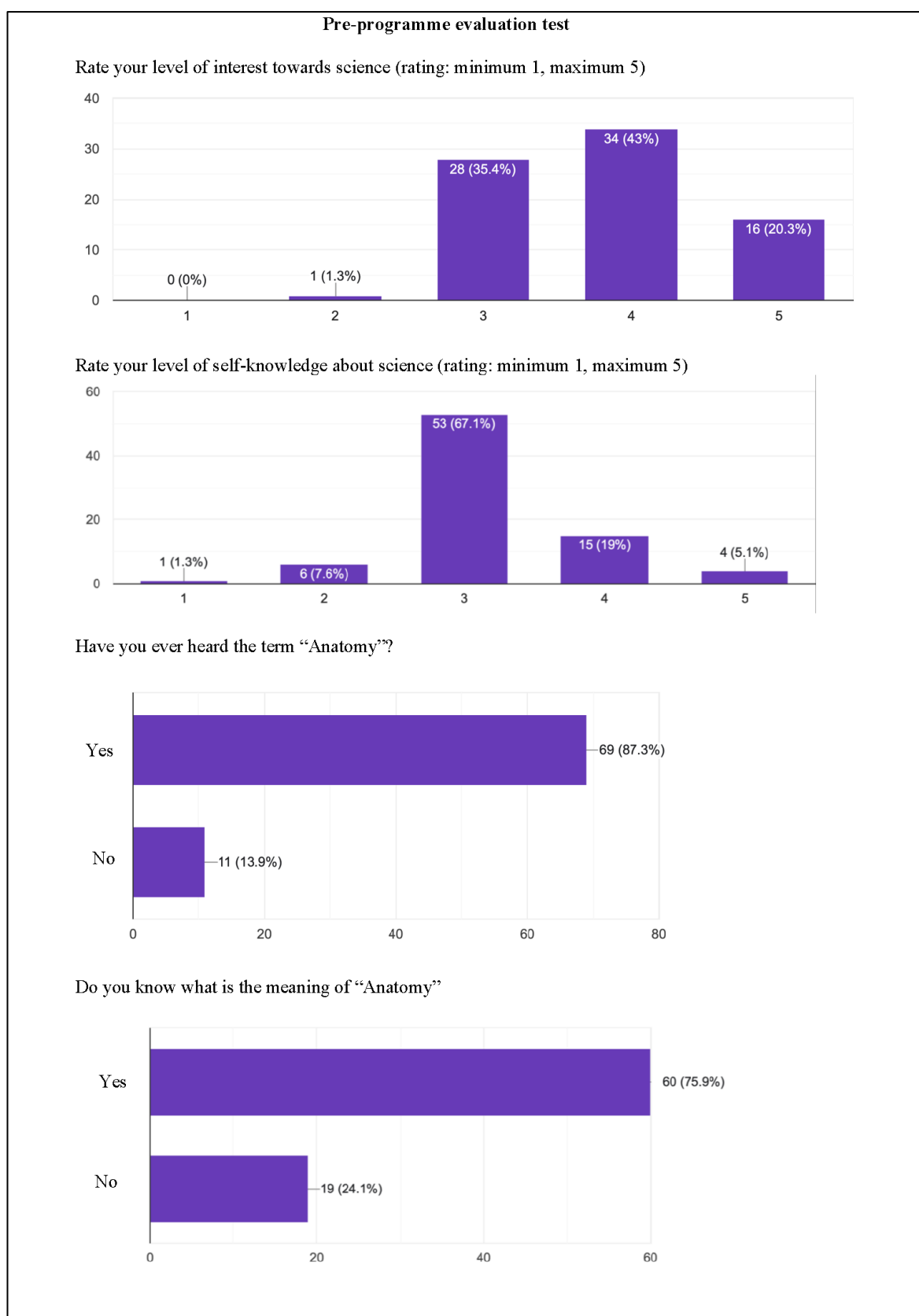


Figure 3 (a): Analysis result of pre-programme evaluation test showed low-moderate level of interest and awareness in science and anatomy knowledge among students

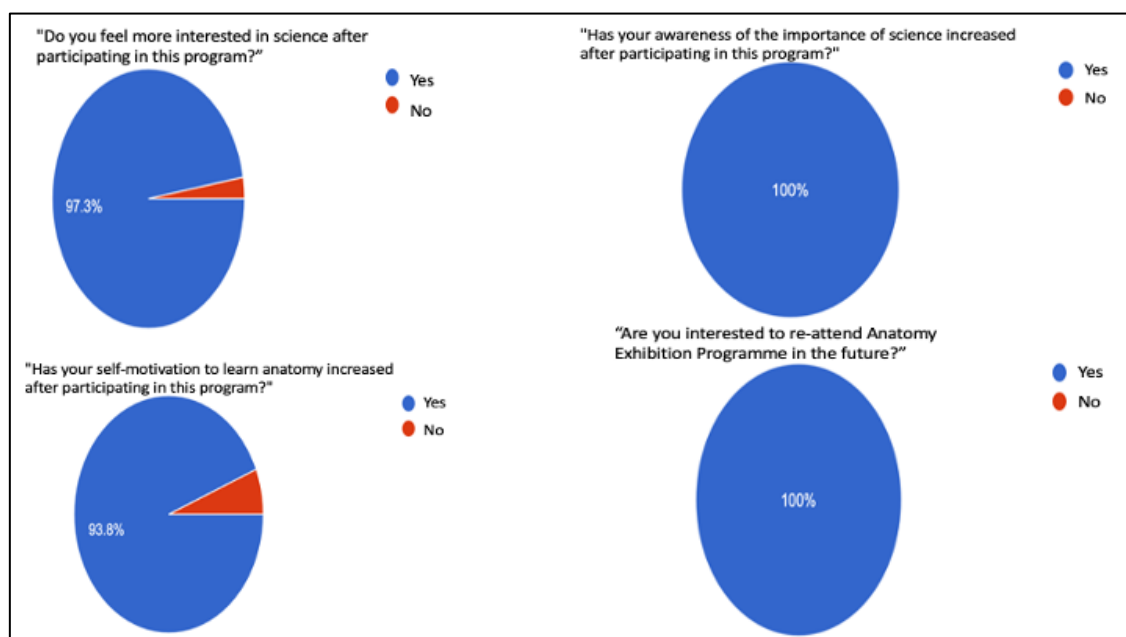


Figure 3 (b): Analysis result of post-programme evaluation test showed increase in interest and awareness in science knowledge among students

DISCUSSION

The outreach programme demonstrated a positive impact on students' awareness and interest in science, both as a subject and as a potential career path. The increase in students' self-reported interest in STEM-related subjects following participation suggests that early exposure to hands-on scientific activities can be an effective strategy for fostering engagement. This aligns with previous research indicating that experiential and inquiry-based learning methods are particularly effective in stimulating curiosity and motivation among secondary school learners^{16,17}.

One of the most notable findings was the shift in perception among students who initially viewed science as difficult or irrelevant to their everyday lives. Focus group discussions revealed that the interactive nature of the workshops, especially those involving real-world applications, such as environmental monitoring and simple biomedical experiments, helped students make meaningful connections between science and society. This suggests that contextualized science education has a critical role in making science more accessible and relatable to younger audiences.

The involvement of university lecturers and professionals as mentors was particularly well received. Several students expressed that hearing about career journeys from scientists of diverse backgrounds helped them envision themselves in similar roles. This underscores the importance of representation and mentorship in outreach programs, particularly for students from underrepresented groups in STEM.

However, the programme also faced challenges. Time constraints limited the depth of content that could be delivered, and some students reported wanting more hands-on experiences or follow-up sessions. Additionally, while the programme reached students from multiple schools, logistical barriers such as transportation and scheduling may have limited participation from more remote or underserved communities. These limitations point to the need for longer-term, sustained engagement models and increased support for school–community partnerships.

Despite these challenges, the programme shows promise as a replicable model for science outreach. Future iterations could benefit from longitudinal tracking to assess whether increased interest

translates into academic or career decisions in STEM. Moreover, embedding teacher development components could enhance the sustainability of the programme and its integration into regular curricula.

In sum, this outreach initiative contributed meaningfully to participants' awareness of science and its role in shaping future opportunities. It also reinforces the growing consensus that early and inclusive science engagement is essential for building a diverse and scientifically literate population.

The Falahiah Secondary School committee was very satisfied with this AOP and planned to organize the event as a yearly event. Based on verbal and online feedback from the students, it could be seen that they were really delighted with the AOP that seemed to increase their awareness and interest in pure science education.

Beyond individual student gains, such outreach programmes foster stronger linkages between universities and local communities, fulfilling the social responsibility mandate of higher education institutions¹⁸. It also provides university students and faculty with valuable experience in science communication and community engagement, skills increasingly recognized as critical in the broader scientific enterprise¹⁹.

Despite its successes, the programme faced challenges, including logistical constraints, limited funding, and limited space with a large crowd of students. The organizers could enhance the learning experience by setting up dedicated booths for each body system or anatomical model, enabling student groups to rotate through the stations and engage more effectively with the material. Addressing these issues requires sustained institutional support, collaborative partnerships with local education authorities, and incorporation of feedback from participating schools²⁰. Future iterations could also integrate digital technologies to expand reach and accessibility, especially in more remote areas.

CONCLUSION

The AOP at Falahiah Secondary School demonstrated that structured, hands-on, and learner-centred approaches can significantly enhance students' awareness, knowledge, and interest in science, particularly within the communities. The measurable gains in science engagement and anatomical understanding underscore the effectiveness of integrating university expertise with community-based educational initiatives. Beyond knowledge acquisition, the programme fostered curiosity, motivation, and aspirations towards science-related academic and career pathways, highlighting the transformative role of early exposure to experiential learning. Its success underscores the potential of university-community partnerships in addressing educational disparities and promoting science literacy. Although logistical challenges remain, the overwhelmingly positive reception from students and teachers affirms the replicability of this model in similar settings. Expanding such initiatives nationally while embedding sustainability through institutional support and community partnerships has the potential to narrow educational disparities and contribute meaningfully to cultivating Malaysia's future generation of scientifically literate and innovative citizens.

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CONFLICT OF INTEREST

None

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