EVALUATING STUDENTS INTEREST ON BIODIVERSITY MONITORING USING DRONE TECHNOLOGY

by

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A report submitted in fulfillment of the requirements for the degree of Bachelor of Applied Science (Natural Resources Science) with Honours

FACULTY OF EARTH SCIENCE
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2024

DECLARATION

I declare that this thesis entitled "Evaluating Students Interest on Biodiversity Monitoring Using Drone Technology" is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : 

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Date : 08 AUGUST 2024

ACKNOWLEDGEMENT

In the name of Allah the Most Gracious and Most Merciful Alhamdulillah, all praise is due to Allah, the Most Gracious and the Most Merciful. By His abundant grace, I have successfully completed the final year project that I have been diligently working on. I would like to extend my heartfelt gratitude to everyone who has supported me throughout this journey. Their guidance, encouragement, and assistance have been crucial to the successful completion of this thesis.

First and foremost, I would like to thank my project supervisor, Dr Noor Janatun Naim Jemali for her continuous support, insightful feedback, and unwavering patience. Her expertise and constructive suggestions have been instrumental in shaping this project. I am also grateful to Ms Nur Kyairatul Syafinie, the coordinator of final year project for her valuable advice and guidance throughout the research process. Their insights have greatly contributed to the depth and quality of this project.

Special thanks to the administration of Sekolah Kebangsaan Jeli 1, where the research was conducted, for providing the necessary resources and facilities. The assistance and cooperation of the staff and members of this institution have been greatly appreciated. Big thanks to the Headmaster, Mr Mohamad Radi Bin Mohamed Rosly, for giving the approval to implement the Drone@School Program (Conservation Edition) 2024 in order to complete this project.

I would also like to extend my appreciation to my classmates and friends for their constant encouragement and for sharing their knowledge and experiences. Their support has been a source of motivation and inspiration. Finally, I am deeply grateful to my family for their unwavering support and understanding. Their belief in my abilities and their constant encouragement have been a driving force throughout my academic journey.

Evaluating Students Interest on Biodiversity Monitoring Using Drone Technology

ABSTRACT

This project aims to assess the interest of primary school students in using drones for biodiversity monitoring as part of STEM (Science, Technology, Engineering and Mathematics) education. A pre-and-post questionnaire survey was the main instrument of this study including DJI Tello drones for simulation purposes. Questionnaire was constructed to assess students' knowledge, experience, and interest in drone technology for conservation efforts. This project was carried out in a school in the Jeli district where the theory and application of drones were introduced in real-life practice. 295 kids were participated in this study. Their knowledge, hands-on experience and passion for drone-focused STEM education was assessed. The response from this project was very encouraging, where the interest of primary school students in using drones for biodiversity monitoring before and after the program recorded a significant increase. This study revealed that students' interest in biodiversity monitoring could be increased through the usage of technology devices such as drones as well as comprehensive exposure.

Menilai Minat Pelajar terhadap Pemantauan Biodiversiti Menggunakan Teknologi Dron

ABSTRAK

Projek ini bertujuan untuk menilai minat pelajar sekolah rendah menggunakan dron untuk pemantauan biodiversiti sebagai sebahagian daripada pendidikan STEM (Sains, Teknologi, Kejuruteraan dan Matematik). Tinjauan soal selidik melalui kaedah sebelum dan selepas program merupakan instrumen utama kajian ini termasuklah dron DJI Tello bagi tujuan simulasi. Soal selidik dibina bagi menilai pengetahuan, pengalaman, dan minat pelajar dalam teknologi dron untuk usaha pemuliharaan biodiversiti. Projek ini telah dijalankan di sebuah sekolah di daerah Jeli di mana teori dan aplikasi dron diperkenalkan dalam amalan kehidupan sebenar. 295 kanak-kanak telah mengambil bahagian dalam kajian ini. Pengetahuan, pengalaman langsung dan semangat mereka untuk pendidikan STEM yang berfokuskan kepada dron telah dinilai. Sambutan daripada projek ini amat menggalakkan, di mana minat pelajar sekolah rendah menggunakan dron untuk pemantauan biodiversiti sebelum-dan-selepas program mencatatkan peningkatan yang ketara. Kajian ini mendedahkan minat pelajar terhadap pemantauan biodiversiti boleh ditingkatkan melalui penggunaan peranti teknologi seperti dron berserta pendedahan yang menyeluruh.

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LIST OF ABBREVIATIONS

GPS	Global Positioning System
ICT	Information and Communication Technology
IR	Industrial Revolution
LiDAR	Light Detection and Ranging
NSW	New South Wales
STEM	Science, Technology, Engineering, and Mathematics
UAV	Unmanned Aerial Vehicle

LIST OF SYMBOLS

%	Percentage

CHAPTER 1

INTRODUCTION

1.1 Background of Study

STEM education focuses on Science, Technologies, Engineering and Mathematics (Shui Ng, W., & Cheng, G., 2019). However, the goal is not limited to educating about specific subjects but instead strives to bring in knowledge that aims to understand our tangible reality, which includes the domain of Industry 4.0 (Akgunduz et al., 2021). STEM education, geared toward equipping students with 21st-century skills, goes some way toward developing an appreciation of technology as a core part of our lives (Noor et al., 2022).

The drone is an uncrewed aircraft, meaning it has no human pilot on board. Unmanned Aerial Vehicles, for short or UAVs, are systems of unmanned aircraft. A drone is a robot that can be manually operated or flow on a predetermined route. It uses embedded systems programmed to follow software-controlled flight plans performed with onboard sensors and a Global Positioning System (GPS) (Medeleine et al., 2022). Most often, UAVs were associated with the military. At first, they were used for training anti-aircraft guns, shooting down aero planes, and gathering intelligence (Siditë et al., 2021). With considerable controversy, it is using them as armament platforms was their primary role. However, drones are used in various areas of civilian life today, such as the teaching practice in Malaysia. Integration of technology and conservation education may be a way to achieve the aim of integrated or holistic education.

1.2 Problem Statement

Although drones have been integrated into the curriculums of university and secondary school students, there is not yet enough research being done into the introduction of drone technology regarding some younger generations especially those from low economic areas. Drones are an ideal learning medium to utilize in STEM for student interest. This empirical method is practical, and therefore they can put all those principles of STEM to the test in a realistic environment. Introduction of drones into STEM curriculum may promote thinking critically and problem-solving, thus revealing possible careers in areas such as science, technology etc (Khaula et al., 2017). Still, measuring the degree of interest among primary school students is crucial to gauge how effective a drone can be as an educational tool and identify potential implementation challenges. This is the way, within which this study could shed light on incorporation of drones into the primary school program and towards enhancing students' interests in STEM disciplines concerning nature preservations including our rich forests.

1.3 Objectives

The objective of this study is to determine the level of knowledge and interest among primary school students in the application of drones to STEM education.

1.4 Scope of Study

This research assesses the level of interest of Level 1 primary school students,

particularly Year 1, Year 2, and Year 3 from Jeli, Kelantan, towards drones as a feature of STEM education. The research design will involve a mixed methods approach that includes questionnaires, interviews, and observations, which will be used as a knowledge process about the level of interest among primary school students for drones in STEM education (Yepes, 2021). This study will involve primary school students from several district schools in Kelantan. Rural school areas that are less able are given priority.

1.5 Significant of Study

This study emphasises incorporating current technologies, particularly drones, into STEM teaching. This integration is critical for increasing young learners' interest and involvement, especially in science and environmental conservation courses. As technology becomes more widely used in numerous industries, providing students with practical skills and expertise to utilize such tools may improve their educational experience and prepare them for future professions in STEM-related disciplines. The difference in interest between level demographic parameters towards using drones in STEM education will be evaluated. Industrial Revolution (IR) 4.0 is a driving factor to encourage all schools, regardless of geographical conditions, to work together in developing ICT and technology (Akgunduz et al., 2021).

CHAPTER 2

LITERATURE REVIEW

2.1 Science, Technology, Engineering and Mathematics

STEM education combines science, technology, engineering, and mathematics into a single learning paradigm. The notion has expanded dramatically since its introduction, with several studies emphasizing its relevance in educating students about the challenges of today's workforce. According to Hasanah (2020), identified four fundamental definitions of STEM education, emphasizing its multidisciplinary character and the need for practical applications in real-world circumstances. This technique improves students' comprehension of scientific ideas while developing critical thinking and problem-solving abilities necessary for future STEM professions.

Furthermore, a literature analysis conducted by the New South Wales (NSW) Department of Education highlights the global acknowledgement of STEM education as a driver of economic growth. It states that 75% of the fastest-growing jobs require STEM abilities, emphasizing the need for educational institutions to adapt and include STEM learning from early childhood to higher education (Wall, J. 2016). The evaluation also emphasizes the need to engage students in inquiry-based and project-based learning to enhance their knowledge and usefulness of STEM disciplines in tackling global concerns.

Despite the recognised value of STEM education, there is a need for increased student enthusiasm, particularly in secondary and primary school.

According to López N. et al. (2022), this apathy stems from various issues, including perceived complexity, a lack of accessible role models, and insufficient exposure to STEM topics. A thorough evaluation found that initiatives targeting under-represented minority students frequently struggle to scale and achieve meaningful participation.

Furthermore, studies have found that traditional teaching approaches frequently fail to connect with students' interests and experiences, resulting in disengagement. The evidence shows that creative teaching practices, such as technology and hands-on learning experiences, can significantly increase student engagement in STEM courses (Sahito Z. et al. (2019). For example, project-based learning that includes real-world challenges can help students understand the relevance and applicability of STEM in their daily lives.

2.2 Unmanned Aerial Vehicles

The term "drone" originates from the realm of science fiction. This term commonly denotes any aircraft that operates without a crew on board, also referred to as "Unmanned Aerial Vehicles" (UAV). A drone is an autonomous aerial vehicle capable of flight and remote operation using onboard sensors and a Global Positioning System (GPS) for control. A drone can be operated through a remote-control device or a mobile application (Custers, 2016). UAVs sometimes called drones, can work effectively in arid, monotonous, or hazardous environments, hence alleviating the need for human pilots. Drones have the potential to enhance operational efficiency. The adoption of drones is increasingly prevalent in numerous countries worldwide.

However, it was really only in the mid-1990s that the United States as a military organization began to use UAVs or drones logically. However, UAVs are almost solely referred to as militant use wear, imposed destruction along with information gathering and usage. Since 2013, there has been an increase in the number of drone users, whether individuals, institutions, or government spaces, to carry out various functions. There are numerous applications of drone usage nowadays, which include search and rescue operations, surveillance activities during crime investigations involving the use of sniffer dogs or research to observe how they might affect different environments like forests that grow faster under shades as compared with open land afterwards results could either be positive but it's too soon (Rebecca, 2023). Today, drones are the modern avionics that have become crucial instruments in film production. In addition, news journalists have also taken up drones to significantly broadcast information from areas that lie far apart geographically. Drones carry out a critical function in facilitated transport, as they allow people to deliver goods even to areas that are far away or cannot be reached because they have no access roads (Alex, 2023). Its only effectiveness is outlined through its substantial advantages.

2.3 Drone Technology in Education

The usage of drone in STEM education is extensive due to their ability to capture true-colour photographs of specific areas. Due to their low altitude, drones can capture imagery with significant levels of detail. Advanced unmanned aerial vehicle (UAV) platforms can incorporate additional sensors, such as LiDAR, thermal sensors, and hyperspectral sensors. One additional benefit of drones' imagery is its

ability to be updated faster than satellite or aerial imagery (Medeleine et al., 2022). Therefore, educational drones' chances can be specifically tailored to examine diverse surroundings and landscapes, making drones teaching tools adaptable.

Drones' adaptability allows them to be utilised in a wide range of educational subjects and customised to align with the research objectives of both educators and students. For instance, drones are frequently employed in remote sensing studies to monitor vegetation (Everaerts, 2008). They serve as essential instruments for managing crops and forests, as they eliminate the need for labour-intensive field sampling measurements (Anthony, 2019). Similarly, drones' analysis can quantify the heights of trees and monitor their growth during a season. Drones' data can be used to measure the canopy cover density in forest stands and generate precise models that describe the age, height, and diameter of trees at breast height. The imagery captured by drones can be examined to categorise the vegetation found along riverbanks and to pinpoint locations where trees have died. Wildlife analysis using drones has encompassed activities such as monitoring nesting bird colonies, tracking hammerhead sharks, and identifying the presence of mammalian species such as orangutans, elephants, and tigers. Considering the wide range of applications of drones in STEM, instructors can choose the most pertinent subject for their students and create a corresponding drone's activity (Shui Ng et al., 2019).

In addition, the use of drones for biodiversity monitoring represents a cutting-edge application of technology in environmental science. Drones provide a cost-effective and efficient means of collecting data on wildlife and ecosystems, making them valuable tools for conservation efforts. Research has shown that

drones can enhance the accuracy and efficiency of biodiversity assessments, allowing for better-informed conservation strategies.

Moreover, integrating drone technology into STEM education can engage students in environmental monitoring and conservation efforts. Studies indicate that exposure to such technology can increase students' interest in STEM fields, particularly when they can see the direct impact of their learning on real-world issues like biodiversity loss (López N. et al. (2022). By using drones in educational settings, students learn about the technology and develop a deeper understanding of ecological principles and the importance of preserving biodiversity.

2.4 Drone Technology in Malaysia

Drone technology is one of Malaysia's growing technologies during the Industrial Revolution 4.0 (4IR) era. Various initiatives are underway to spark students' curiosity in STEM by using drone technology in educational programs for school and university students (Aidei Ramli et al., 2023). This is a result of very low student enrollment in STEM professions. Therefore, fostering students' enthusiasm for using drones in STEM education should start early. Nevertheless, the endeavor to introduce drone technology to young children was rare. This could be attributed to the challenges of introducing drone technology to pupils as young as seven. The complexity of the technology may pose difficulties for young children to comprehend, and not all parents and teachers possess the necessary skills to operate drones. Operating drones in the presence of small children poses a significant risk and is also considerably costly. In order to expedite the acquisition of knowledge in drone technology, it is imperative to expose young children to it

from an early age. This will ignite their curiosity in drone technology and foster their enthusiasm for Science, Technology, Engineering, and Mathematics (STEM) education.

Thus, this program is implemented in several primary schools in Jeli, Kelantan. Before the program begins, students must answer a questionnaire about their level of interest in drones. After that, after the end of the program, they will be asked to answer the same questionnaire (Noor Janatun et al., 2022). Data will be collected and examined using qualitative methods. This program has facilitated students in improving their understanding of drone technology and fostering their enthusiasm for STEM education.

CHAPTER 3

MATERIALS AND METHOD

3.1 Study Area

This study was conducted in a school located in Kelantan. Previously, the selection of the school is based on the recommendation of the Department of Education regarding priority given to schools that lack of ICT and technology facilities, are in rural areas, and include many less able students. However, due to certain rules by Ministry of Education and Department of Education Kelantan on the restriction to carry out outdoor activities, only Sekolah Kebangsaan Jeli 1 had taken the offers for this project.

Sekolah Kebangsaan Jeli 1, located in Jeli, Kelantan, Malaysia, was established in 1950. The school has been serving the local community by providing primary education for many years. Currently, the schools have about 900 students and 69 teachers (Din J., 2020). It is the selected school appointed as Trust School Program in Kelantan. The mission of this school is to provide educational opportunities that balanced and holistic and produces people who knowledgeable, faithful, skilled, moral noble and prosperous through management strategic and professional.

3.2 Materials

Drone (DJI Tello) was the main technology devices uses in this study. Prior to that, the development of instrument for pre-and-post survey was developed following Aidei Ramli et al., (2023). The section includes demographic characteristics include age, gender, place of residence. The second section was on the knowledge, experience and interest towards drone technology in conservation efforts. The survey include questions about students' familiarity with drones, their perception of drones as educational tools and their interest in pursuing STEM-related careers involving drones. Survey instrument consists of multiple choice or closed-end question and Likert scales to determine feelings or opinions towards certain issues by allowing the respondents to choose their answer. Interpretation of the mean score on a 5-point Likert scale was also used to determine the level of interest of the respondents before and after the program (Neuman, 2012).

This question uses a 5-choice Likert scale that involves the times 1 Star = Very Poor, 2 Star = Poor, 3 Star = Acceptable, 4 Star = Good, and 5 Star = Very Good to measure the respondent's understanding of drones and the environment before and after joining the program (Table 1). A mean score of 1.00 to 2.39 indicates a low interpretation, while a mean score of 2.40 to 3.70 describes a moderate interpretation, and a mean score of 3.71 to 5 indicates a high interpretation. A high mean score indicates a good understanding of drones and the environment.

Mean Score	Level of Understanding
1.00 – 2.39	Low
2.40 – 3.70	Moderate
3.71 – 5.00	High

Source: Neuman (2012)

Table 3.1: Interpretation of the mean score on a 5-point Likert scale

This set of questionnaire was given to the participants to evaluate their knowledge and interest on STEM education focuses on biodiversity conservation using drones application. Different scenarios on vegetated and deforestation areas were shown to the respondents using drone's camera. Respondent's knowledge and interest were evaluated before and after the program completed.

3.3 Methods

The study starts with instrument development of survey questionnaire. The survey questionnaire was designed to answer the level of knowledge and interest of respondents at the selected schools.

After the questionnaires were completely constructed, a pre-test or pilot survey was conducted to test the reliability of the questions with a small number of respondents before conducting the actual fieldwork. This exercise was conducted for 30 participants. The reliability of the questionnaire survey was evaluated based on Cronbach's alpha. The test was run in Excel software.

At the real data collection, a program named Drone@School Program (Conservation Edition) was carried out at Sekolah Kebangsaan Jeli 1, located in Jeli, Kelantan. This event offer students with practical experience in assessing their

enthusiasm for STEM education focused biodiversity conservation. Prior to the program, a pre survey was distributed and at the end of the program, thepost survey test is conducted. Data collected were then tabulated and analyzed quantitatively using Excel software before the final results is produced.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Pilot Test

The "Dron @ Kampungku Desa Putra" program was held on December 23, 2023, from 8.00 am until 1.30 pm in the Great Hall, Kampung Desa Putra, at Kajang, Selangor. This initiative aims to evaluate pilot survey questions before using them to collect primary data at Sekolah Kebangsaan Jeli 1, Jeli, Kelantan. This program had 28 participants ranging in age from 6 to 14 years. All participants were asked about their knowledge and interest in drone technology before and after the program. Cronbach's alpha calculations yielded a value of 0.86, indicating that this questionnaire may be utilised to acquire primary data.

4.2 Classification of Respondents

On May 13, 2024, from 9:00 a.m. to 12.30 p.m., a "Drone@School (Conservation Edition)" program was held in the open hall of Sekolah Kebangsaan Jeli 1, Jeli, Kelantan. 295 respondents have participated in this program aged between 7 to 9 years (Figure 4.1), with 49.50% boys and the remaining were girls. 99 respondents (33.56%) are at the age of 7 and 91 respondents (30.85%) are 8 years old students. Meanwhile, 105 respondents (35.59%) are 9 years old kids.

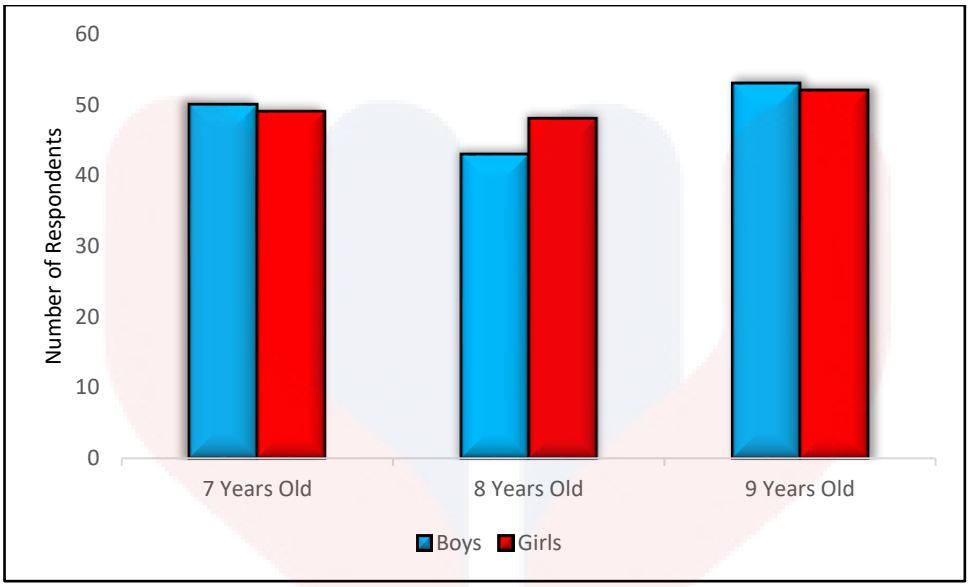

Figure 4.1: Classification of respondents according to age.

4.3 Comprehension of Respondents

Figure 4.2 shows the increment of respondent comprehension towards drone and its function for environment in general. Principally, for standard one until three there was an increase in understanding after the practical session using drone was done to each focus group. The results show that the 7 years old students show the highest increment understanding related to drone and its functions to the environment with 19.20%. Meanwhile, 8 and 9 years old students show an increase of 6.60% and 7.62% level of understanding respectively.

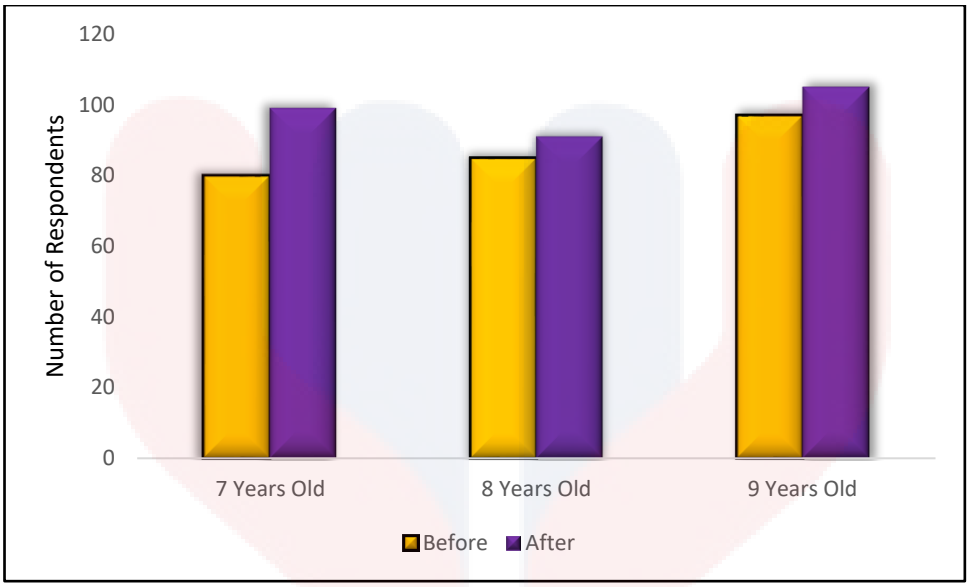

Figure 4.2: Respondents understanding of drones and environment.

The students' level of understanding of drones and the environment before the program was in low category according to scores by Neuman (2012), with an average of 1.67. However, there was a significant improvement in the students' comprehension of drones and the environment after the program, which recorded a high average of mean scores at 4.76. This demonstrates that the student's level of comprehension increased following the program's completion.

4.4 Level of Understanding

The level of respondent's understanding was evaluated based on several questions. It includes their understanding of the drone, functions and the ability of the drone in monitoring flora and fauna. They were also questioned on how drone technology can help forest conservation and environmental monitoring. Overall, the average level of understanding of the respondents before the program was only 76%. However, there was an increase of 10% after the program, so the percentage

increased to 86%.

Figure 4.3 show an increase of 4.75% on knowledge of using drones could helped in monitor endangered species. 11.53% of the respondents showed an increase of comprehension and believe that drone technology could help forest conservation. Meanwhile, the highest increment of level of understanding is when they have a good expectation that drones that could be used to detect environmental changes with 14.57%. The kids were given an exposure with real world examples lead by the facilitator to engage them in understanding the different situations.

Study by Fatin et al., (2021) suggests that to expedite drone technology learning in young children, it should be introduced at a young age, particularly to boost their interest in drone technology as well as Science, Technology, Engineering, and Mathematics (STEM) study.

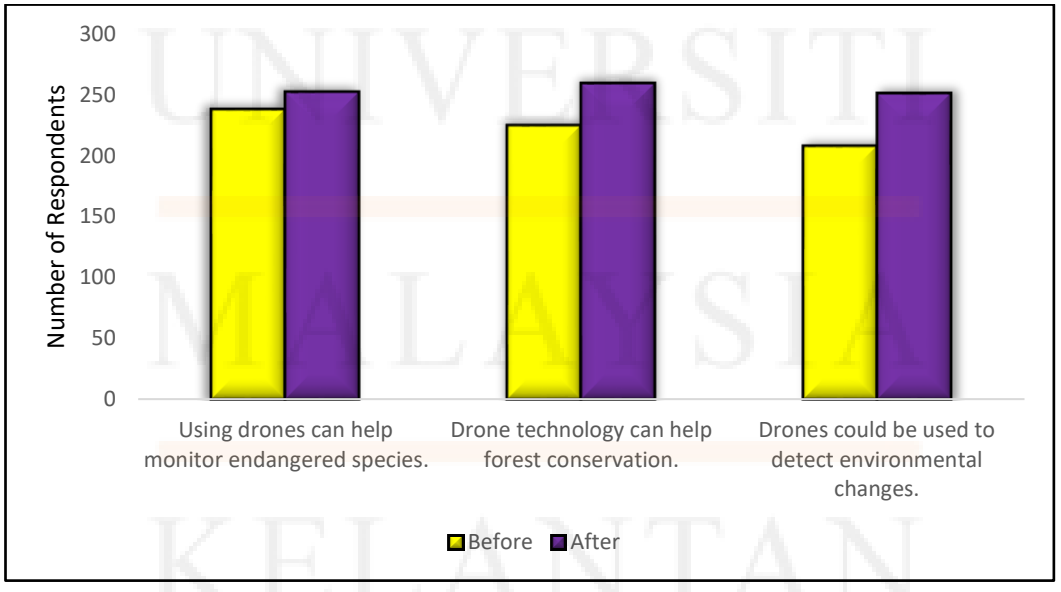

Figure 4.3: Respondents level of understanding regarding drone, conservation and environmental changes.

4.5 Level of Interest

The level of respondent's interest was evaluated based on several questions. It includes their interest in playing with drones and desire to own and play with the drones. There were also questions on how this program had attracted respondent's interest in learning science and technology. Overall, the average level of understanding of the respondents before the program was only 78.9%. However, there was an increase of 8.2% after the program, so the percentage increased to 87.1%.

Figure 4.4 show an increase of 7.80% of interest in playing with drones. Before the program, many respondents did not show interest in activity conducted. But it changed after the practical session. The highest increment of interest related to level of interest is on desire to have and piloting the drones with 14.90%. They get excited when given opportunity to control the drone individually. From the survey, only 15% of the respondent had owned drone at home. The rest only know and first time touches the drone when this research is carried out. Respondent get so excited during practical session and it was a good sign hence sparks their interest and enthusiasm towards technology. After the program, students were particularly interested in training and education required to become a pilot, the job opportunities for drone pilots, as well as how to purchase/rent a drone and their varying technical capacities. This program also had attracted respondent's interest in learning science and technology by showing an increase of interest at 4.75%.

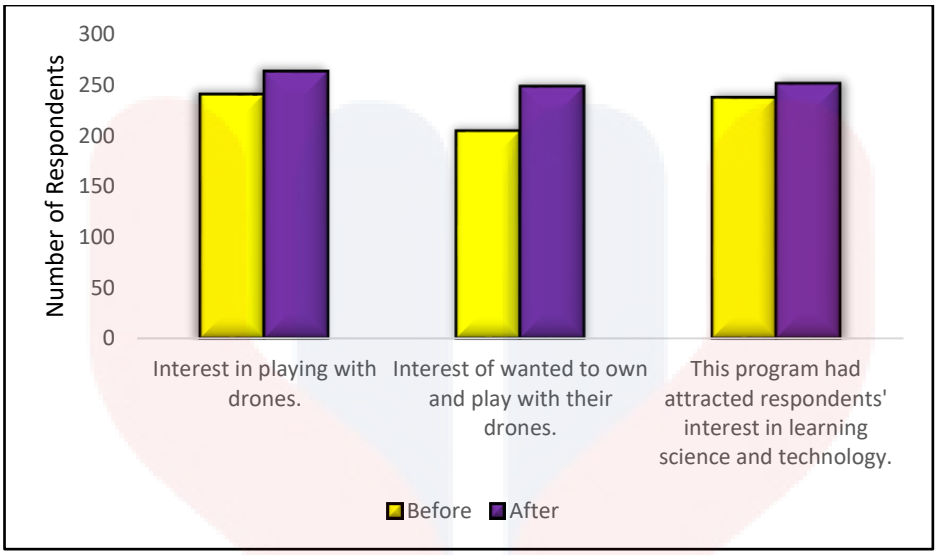

Figure 4.4: Respondents level of interest playing drone while learning science and technology.

The mean score of interest level was recorded in low category (1.58) at the beginning of program and rise to 4.71 after the completion Results of this study show a beneficial effect in increasing respondents' enthusiasm for playing with drones and studying science and technology. According to Shui Ng et al. (2019) and Noor et al (2022), drone technology is an effective teaching tool for engaging student's interest in STEM subjects. It provides a hands-on, practical approach in learning that enables students to apply STEM ideas in real-world scenarios.

Introducing drone related programs for kids can significantly boost their knowledge and interest in various fields (Noor et al., 2022; Shui & Chen 2019; Kazunori 2019). Meanwhile, implementing a drone program can have a profound and lasting impact on kids, igniting their passion for STEM including biodiversity conservation and providing them with skills that will benefit them throughout their education and future careers.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

An increase in primary school student's interest and knowledge of using drone for biodiversity conservation is a significant finding of this study. It was demonstrated by an increase in specific questions for knowledge and interest in pre-and-post survey. Questions such as interest in learning subjects related to science, technology, and mathematics had change respondents' interest in learning science and technology. They belief that drones can aid in forest conservation and level of interest increase after go through the program.

The students' level of understanding of drones and the environment before the program was in low category, with an average of 1.67. However, there was a significant improvement in the students' comprehension of drones and the environment after the program, which recorded a high average of mean scores at 4.76. This demonstrates that the student's level of comprehension increased following the program's completion. Meanwhile, mean score of interest level was recorded at 1.58 at the beginning of program and rise to 4.71 after the completion.

5.2 Recommendations

In future, this study could be expanded and enhanced by:

- Selection of participants and school should be added. Various schools and background should involve in the project that can increase number of respondent and represent more significant conclusion for Kelantan regions.
- More time needed in testing the instrument, getting permission from authorities or department of education
- Develop or establish a drone club for extracurricular activities to support student's interest in drone technology and science education.

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APPENDICES

APPENDIX A

Jalan Utama , Desa Putra ,43000 Kajang ,
SELANGOR DARUL EHSAN

Ruj Kami :MAIDPBRR.D@K./03(02)
Trikh :12 Disember 2023

Kepada:
SENARAI SEPERTI EDARAN

YBhg. tuan/puan,

JEMPUTAN SEBAGAI FASILITATOR BAGI PROGRAM 'DRON @ KAMPUNGKU DESA PUTRA'

Adalah dengan segala hormatnya, peerkara diatas adalah dirujuk.

2. Sukacita dimaklumkan bahawa Masjid Al-Iman, Desa Putra akan mengadakan Program 'Dron @ Kampungku Desa Putra' pada ketetapan berikut:

Tarikh : 23 Disember 2023 (Sabtu)
Tempat : Dewan Besar,Kampung Desa Putra
Masa : 8.00 pagi – 1.30 tengahari

3. Sehubungan dengan itu, kami ingin menjemput YBhg. Tuan/puan sebagai fasilitator bagi program tersebut.

4. Segala kerjasama dan keperihatinan tuan/puan amat kami hargai dan didahului dengan ucapan terima kasih.

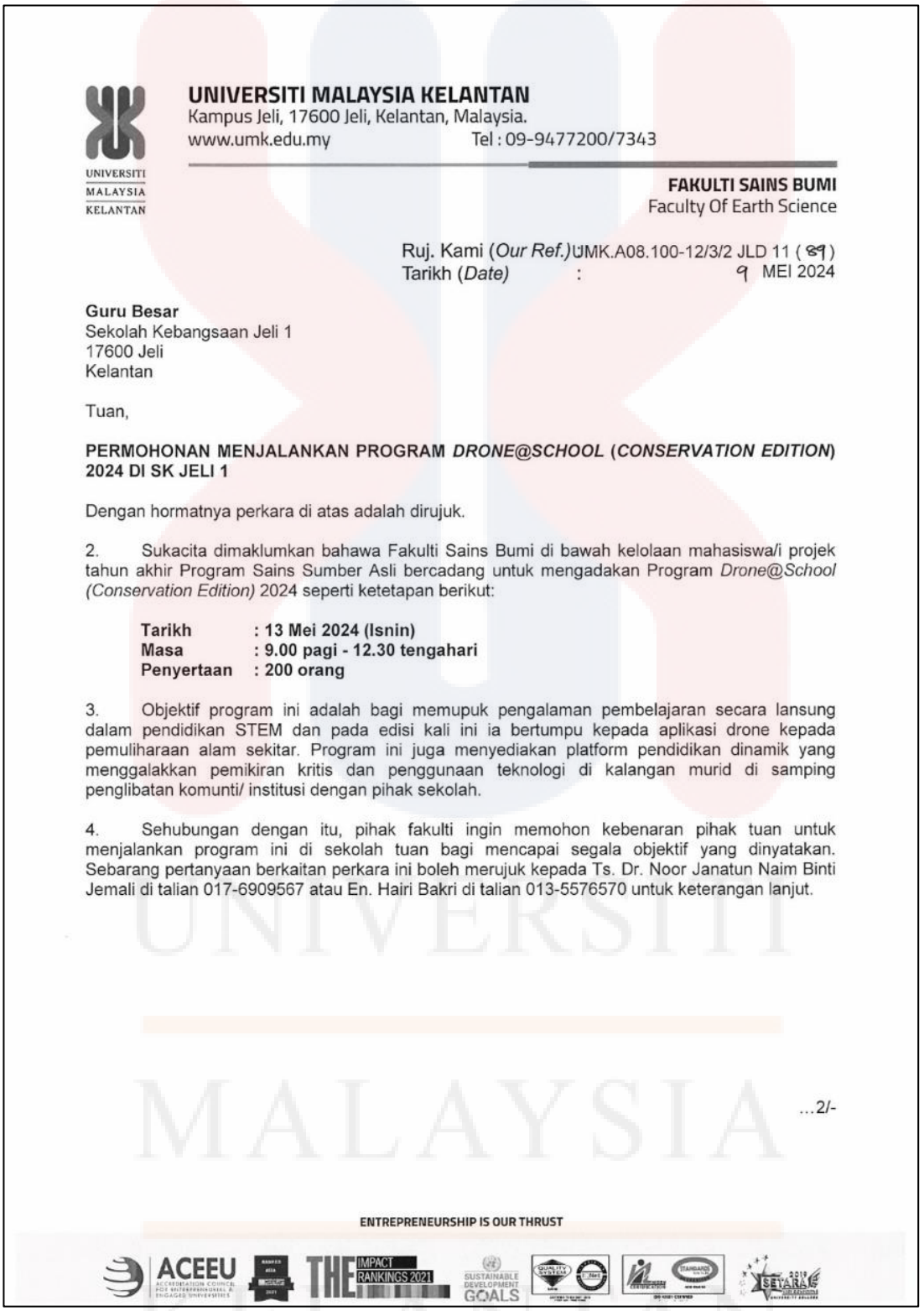
Sekian, terima kasih.

Yang Benar,

Tuan Haji Mohamed Nor Bin Ihwan
Nazir
Masjid Al-Iman
Desa Putra
43000 Kajang,
Selangor

The offer letter for "Drone @ Kampungku Desa Putra" program.

APPENDIX B



UNIVERSITI MALAYSIA KELANTAN
Kampus Jeli, 17600 Jeli, Kelantan, Malaysia.
www.umk.edu.my Tel : 09-9477200/7343

UNIVERSITI MALAYSIA KELANTAN

FAKULTI SAINS BUMI
Faculty Of Earth Science

Ruj. Kami (*Our Ref.*) UMK.A08.100-12/3/2 JLD 11 (89)
Tarikh (*Date*) : 9 MEI 2024

Guru Besar
Sekolah Kebangsaan Jeli 1
17600 Jeli
Kelantan

Tuan,

PERMOHONAN MENJALANKAN PROGRAM *DRONE@SCHOOL* (*CONSERVATION EDITION*) 2024 DI SK JELI 1

Dengan hormatnya perkara di atas adalah dirujuk.

2. Sukacita dimaklumkan bahawa Fakulti Sains Bumi di bawah kelolaan mahasiswa/i projek tahun akhir Program Sains Sumber Asli bercadang untuk mengadakan Program *Drone@School (Conservation Edition)* 2024 seperti ketetapan berikut:

Tarikh : 13 Mei 2024 (Isnin)
Masa : 9.00 pagi - 12.30 tengahari
Penyertaan : 200 orang

3. Objektif program ini adalah bagi memupuk pengalaman pembelajaran secara lansung dalam pendidikan STEM dan pada edisi kali ini ia bertumpu kepada aplikasi drone kepada pemuliharaan alam sekitar. Program ini juga menyediakan platform pendidikan dinamik yang menggalakkan pemikiran kritis dan penggunaan teknologi di kalangan murid di samping penglibatan komunti/ institusi dengan pihak sekolah.

4. Sehubungan dengan itu, pihak fakulti ingin memohon kebenaran pihak tuan untuk menjalankan program ini di sekolah tuan bagi mencapai segala objektif yang dinyatakan. Sebarang pertanyaan berkaitan perkara ini boleh merujuk kepada Ts. Dr. Noor Janatun Naim Binti Jemali di talian 017-6909567 atau En. Hairi Bakri di talian 013-5576570 untuk keterangan lanjut.

...2/-

ENTREPRENEURSHIP IS OUR THRUST

UMK.A08.100-12/3/2 JLD 11 (89)

Segala kerjasama dan perhatian daripada pihak tuan amat dihargai dan didahului dengan ucapan terima kasih.

Sekian.

"ISLAM MEMIMPIN, RAJA MENAUNGI, NEGERI BERKAT"
"MALAYSIA MADANI"
"BERKHIDMAT UNTUK NEGARA"

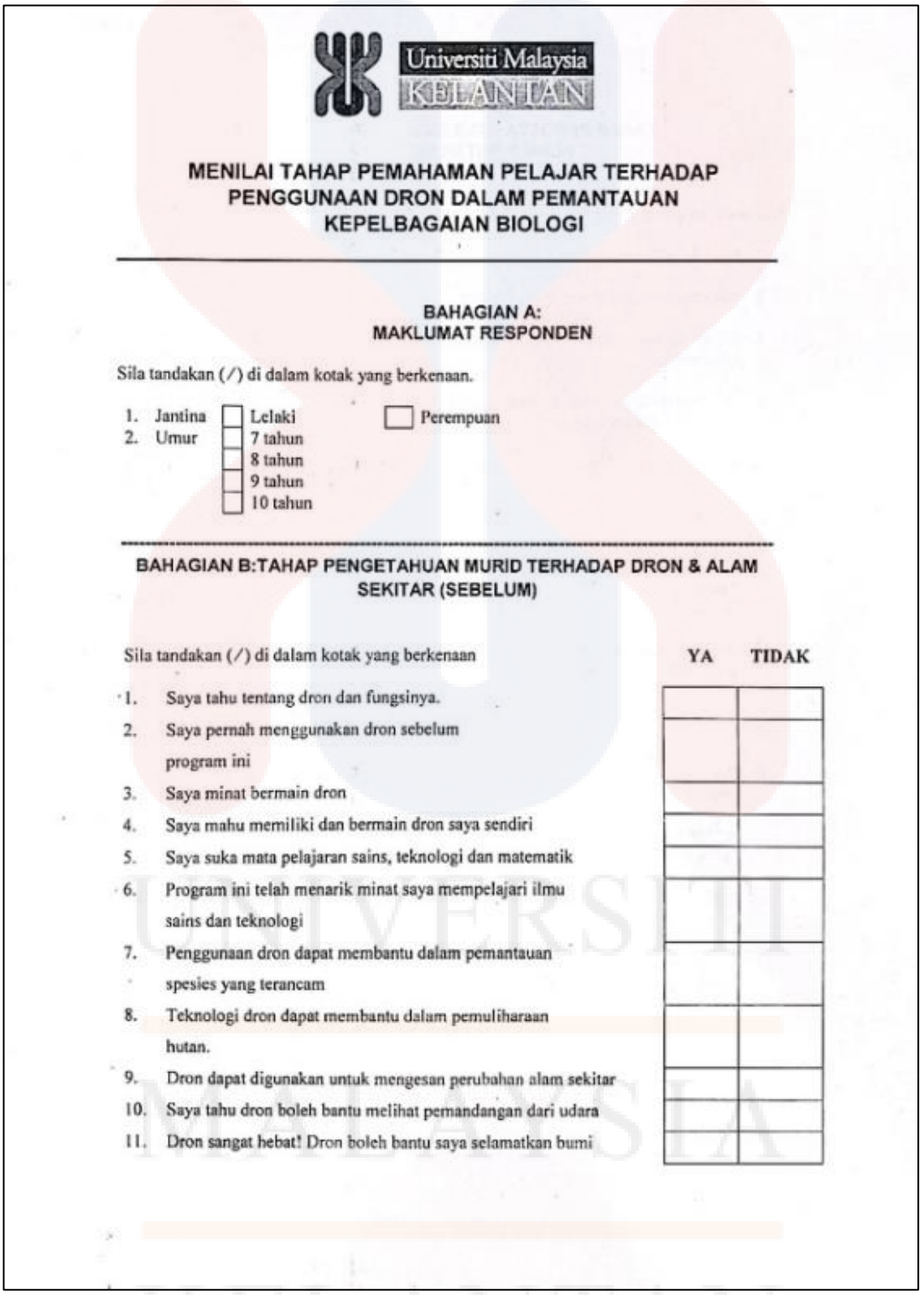
Saya yang menjalankan amanah,

PROF. MADYA DR. ZULHAZMAN BIN HAMZAH
Dekan

-2-

The official document for "Drone @ Kampungku Desa Putra" program.

APPENDIX C



Universiti Malaysia KELANTAN

MENILAI TAHAP PEMAHAMAN PELAJAR TERHADAP PENGGUNAAN DRON DALAM PEMANTAUAN KEPELBAGAIAN BIOLOGI

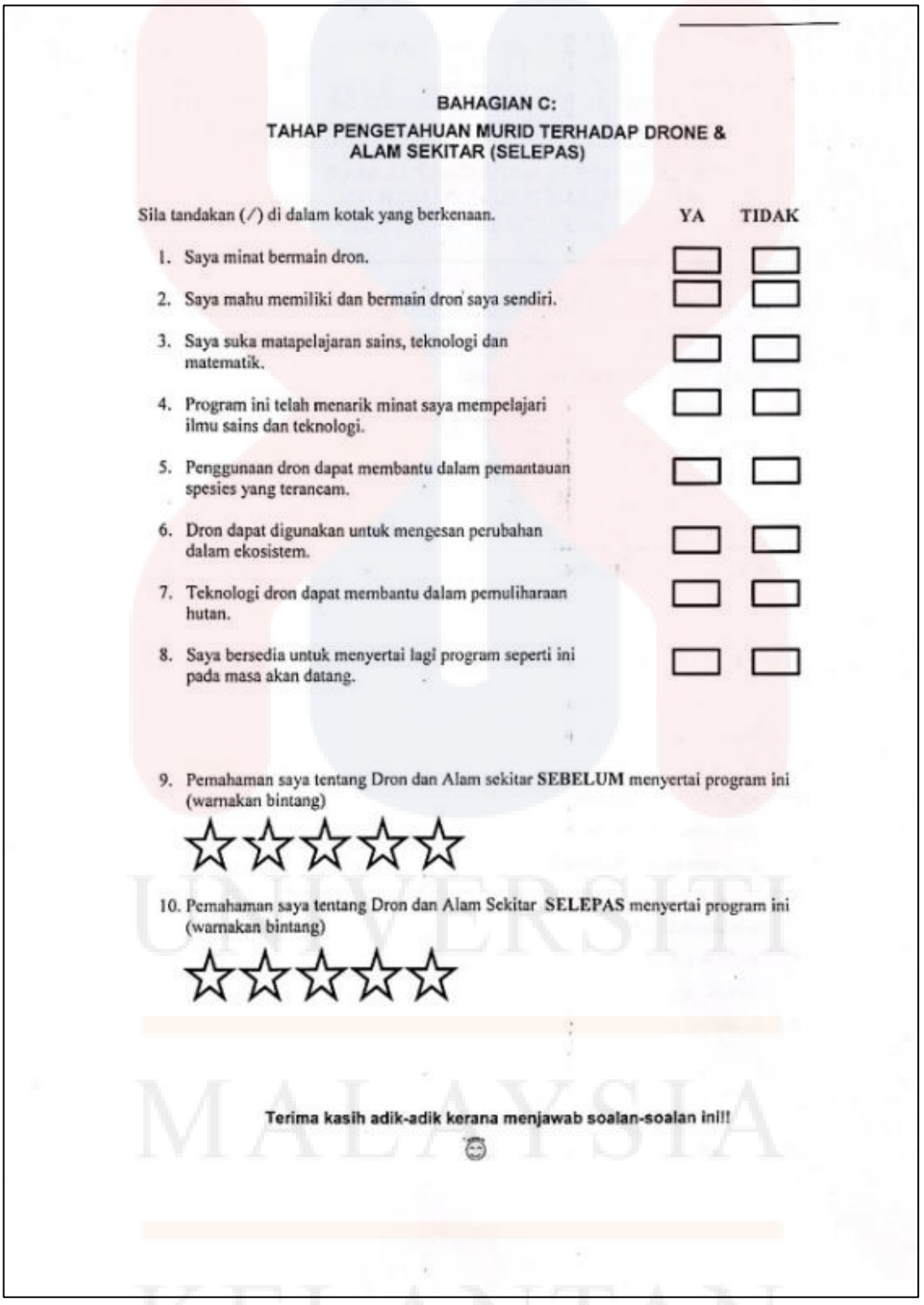
BAHAGIAN A:
MAKLUMAT RESPONDEN

Sila tandakan (/) di dalam kotak yang berkenaan.

1. Jantina ☐ Lelaki ☐ Perempuan
2. Umur ☐ 7 tahun ☐ 8 tahun ☐ 9 tahun ☐ 10 tahun

BAHAGIAN B:TAHAP PENGETAHUAN MURID TERHADAP DRON & ALAM SEKITAR (SEBELUM)

Sila tandakan (/) di dalam kotak yang berkenaan	YA	TIDAK
1. Saya tahu tentang dron dan fungsinya.		
2. Saya pernah menggunakan dron sebelum program ini		
3. Saya minat bermain dron		
4. Saya mahu memiliki dan bermain dron saya sendiri		
5. Saya suka mata pelajaran sains, teknologi dan matematik		
6. Program ini telah menarik minat saya mempelajari ilmu sains dan teknologi		
7. Penggunaan dron dapat membantu dalam pemantauan spesies yang terancam		
8. Teknologi dron dapat membantu dalam pemuliharaan hutan.		
9. Dron dapat digunakan untuk mengesan perubahan alam sekitar		
10. Saya tahu dron boleh bantu melihat pemandangan dari udara		
11. Dron sangat hebat! Dron boleh bantu saya selamatkan bumi		



BAHAGIAN C:

TAHAP PENGETAHUAN MURID TERHADAP DRONE & ALAM SEKITAR (SELEPAS)

Sila tandakan (/) di dalam kotak yang berkenaan.	YA	TIDAK
1. Saya minat bermain dron.	☐	☐
2. Saya mahu memiliki dan bermain dron saya sendiri.	☐	☐
3. Saya suka matapelajaran sains, teknologi dan matematik.	☐	☐
4. Program ini telah menarik minat saya mempelajari ilmu sains dan teknologi.	☐	☐
5. Penggunaan dron dapat membantu dalam pemantauan spesies yang terancam.	☐	☐
6. Dron dapat digunakan untuk mengesan perubahan dalam ekosistem.	☐	☐
7. Teknologi dron dapat membantu dalam pemuliharaan hutan.	☐	☐
8. Saya bersedia untuk menyertai lagi program seperti ini pada masa akan datang.	☐	☐

9. Pemahaman saya tentang Dron dan Alam sekitar **SEBELUM** menyertai program ini (warnakan bintang)

☆☆☆☆☆

10. Pemahaman saya tentang Dron dan Alam Sekitar **SELEPAS** menyertai program ini (warnakan bintang)

☆☆☆☆☆

Terima kasih adik-adik kerana menjawab soalan-soalan ini!!!

The questionnaire form.

APPENDIX D

The program of "Dron @ Kampungku Desa Putra at Kajang, Selangor.

APPENDIX E

The program of "Drone@School (Conservation Edition) 2024 at Sekolah Kebangsaan Jeli 1, Jeli, Kelantan.