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Science, Technology, and Opportunity: An Unmanned Aerial Vehicle (UAV) Seminar

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Abstract: *In the last decade, there has been a rapidly growing improvement in the UAVs pertinency in multiple areas, such as, science, technology, engineering, and mathematics (STEM) professions. Therefore, there is a growing need to integrate UAV training into STEM education, where several studies have been conducted and some opportunities could be gained from this area. Two of the opportunities are (1) UAV can be low cost therefore affordable for schools and (2) UAVs are relatable to real world cases which may inspire students. These opportunities were good to share and discuss with the teachers, and later, teachers could share this with the students. SMP Negeri 174 Jakarta is a community service school partner. A seminar about this UAV, its technology, science, and opportunities was held in this school to disseminate knowledge on how the UAV has become important to pay attention to in the near future.*

Introduction

UAVs, known as drones, are operated with no onboard pilot (Bolick et al., 2022). In the last decade, there has been a rapidly growing improvement in the pertinency of drones in multiple areas, comprising monitoring, military operations, public security, hidden or hazardous areas exploration, disaster assistance, traffic surveillance, damage assessment, indoor-outdoor navigation, infrastructure management, precision agriculture, and logistics, due to the lightweight, high maneuverability, and compact design (Mohsan et al., 2022). The latest UAV technology development using camera-mounted has been widely used (Thoha et al., 2022). UAV-enabled unified sensing and communication have interested growing research interests in sixth-generation wireless networks. UAVs were aerial wireless platforms for better coverage and improved sensing and communication services (Meng et al., 2024).

UAV usage has increased in the science, technology, engineering, and mathematics (STEM) professions. There is an expanding demand to integrate UAV training into STEM education (Bolick et al., 2022). UAVs provide a gateway for motivating learners with mathematical topics. They are also included in the resources that allow students and their

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coaches to engage in active learning that encompasses innovation, creativity, ingenuity, competition, discovery, exploration, and collaboration (Amenyo et al., 2023).

Several studies have been conducted (Harjon et al., 2021) on UAVs, and some opportunities could be gained from this area. Remotely Piloted Aircraft (RPA), the number of tasks in civil aviation is increasing, and application scope, ranging from emergency assignments for public authorities to profit-making uses (Schmidt et al., 2022).

These opportunities were good to share and discuss with the teachers, and later, teachers could share this with the students. SMP Negeri 174 Jakarta is a community service school partner, and several community service activities have been accomplished together (Djajasoepena et al., 2024; Prasetyo et al., 2023). As far as we, Sampoerna University (SU) lecturers, had observed, SMP Negeri 174 Jakarta has not been using UAV as a medium of learning some subjects, mainly STEM. A seminar about this UAV, its technology, science, and opportunities was held in this school to disseminate knowledge on how the UAV has become essential to pay attention to soon.

Method

In December 2024, two community service activities with different topics and audiences occurred in SMP Negeri 174 Jakarta. This community service was held in the school with audiences of teachers and staff. Figure 1 shows sequential activities for this community service:

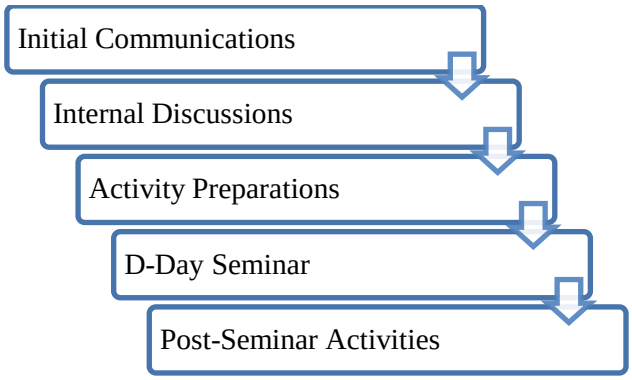

Figure 1. Community Service Activities

In October 2024, an initial communication was established with a school representative through an audio call and instant messaging chats. Discussions related to the community services were about topics, event format, audiences, and when and where the event would be held took place.

One of the notable issue which the school have faced is the problem that students may need something that can inspire and engage them to learn, especially STEM subjects. We, SU

lecturers, saw an opportunity to introduce UAV as a solution to this issue, in the form of implementing at least two of many opportunities (Amenyo et al., 2023) where among those are (1) UAV can be low cost therefore affordable for the school and (2) UAVs are relatable to real world cases therefore may inspire students to learn about STEM concepts.

Then, internal activity discussions were held about paperwork, certificates for audiences and organizers, presentation slides, merchandise, and more. An event format was decided as a seminar, with teachers and staff as audiences. The event duration was 90 minutes in the school multimedia room. Tasks for the organizers have been distributed proportionally to ensure that the event runs smoothly.

Activity preparations involved gathering participants' names, ordering food and beverages for the community service event, finalizing presentation slides, and delivering them to the school organizer. An event e-flyer was designed for publication before the event and published on the school's social media.

The event seminar was on Friday, 13 December 2024, starting at 13.30 and lasting 90 minutes. More than 40 participants participated in the community service activity. The seminar was held in a formal academic ambiance from the opening to the closing. Topics included drones, types of drones, drone fields of work, potential job roles as drone pilots, and drone associations in Indonesia. Participants were enthusiastic about the seminar, as demonstrated by the number of questions raised during the Q&A session. However, due to constraints of time, we cannot provide post-seminar feedback form which can measure the overall satisfaction from the participants. This is an important aspect of our community service event which we need to tackle in the future events.

Post-seminar activities included paperwork to write the report, generating a community service manuscript to be submitted to the community service journal, and distributing participants' certificates in electronic and printed formats. Organizers and resource-person certificates were required to be signed by the school principals. Event publications have been featured on Instagram and LinkedIn.

Result

The community service agenda lasted less than a second half-day after the Friday Prayer. The event went well, from registration to taking photos for documentation purposes. All seminar materials were delivered as scheduled. Following Figure 2 shows the seminar:

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Figure 2. Community Service Seminar

As shown in Figure 2, the resource person shared the seminar material with presentation slides in front of the multimedia room. Due to the fascinating topic, the seminar format was more like a sharing session. More time in the Q&A session made it more interactive with the audience.

Since the topic of the talk is mainly as an introduction to UAVs and their opportunities in educating students about STEM concepts, further community service events are needed in order to see the effectiveness of using UAV and see whether we can reproduce the results of (Bolick et al., 2022).

Discussion

The community service initiatives commenced at the beginning of November 2024 and ended in late December 2024 at SMP Negeri 174 Jakarta. The event details with its completions shown in the following Table 1:

Table 1. Activity Descriptions

#	Activities	Status
1	Initial Communications	Achieved
2	Internal Discussions	Achieved
3	Activity Preparations	Achieved
4	D-Day Seminar	Achieved
5	Post-Seminar Activities	Achieved

Table 1 shows that all activities were achieved at a 100% rate. Activities 1, 2, and 5 were most accomplished by online coordination through messaging services, and activities 3 and 4 were completed offline. Sub-activities were completed, but only these five are shown in

Table 1 as major activities for community service.

The study by (Bolick et al., 2022) mainly discusses the student knowledge retention and understanding of using UAV. UAV laboratory exercise was done to teach students about UAV data acquisition and processing and using an online quiz the student's knowledge is measured to determine the effectiveness of the education module. Our community service event can be continued in the future to follow and perhaps expand the study by Bolick et al.

Conclusions and Recommendations

This article describes community service activities in the SMP Negeri 174 Jakarta between November and December 2024. The session was successfully delivered in around one and a half hours with days of preparations. Recommendations for this community service initiative are to have similar topics related to the UAV with different audiences and conduct pre- and post-event surveys. The outcome of this community service event is to introduce teachers and staff of SMP Negeri 174 Jakarta about the opportunities using UAVs in teaching students about STEM topics. In order to continue with another community service event, our recommendation is that perhaps we may do another event similar to a short workshop for students as the audience with topics related to education using a particular UAV.

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