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Application of Drone Technology in Learning Process Strategies

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Abstract

The use of drones in education rapidly used nowadays especially in STEM Education (Science, Technology, and Engineering & Mathematic). The aim of this study was to identify the level of perception, acceptance and trend among primary and secondary school teacher about using drone in education. The findings of this study, it can be concluded that teachers have a high level of acceptance on using a drone technology. However, the level of teachers tendency to integrate drones in teaching and learning is slightly higher than the level of teachers' acceptance and perception.

Keyword: Drone Education, STEM

Introduction

The development in Malaysian Education System is a benchmark of aim being developed country by 2020. In order to achieve the mission being one of the develop country, Science and Techology received high intention since 1986. A wave of technology development changes the lifestyle in the community around the world including changing in education, social economy, etc. (Noraini, 2010). As the results. Malaysian Education introduce STEM Education (Science, Technology, and Engineering & Mathematic) through the Malaysian Education Development Plan (PPPM) 2013 - 2025. STEM education seen as a catalyst for the k-economy in Malaysia. This can be realized through the provision of equal access to quality education in an international standard , strengthening STEM education through an improved curriculum, implementation and monitoring in reducing knowledge and skills gaps among students, and exploring the use of blended learning models that enhance technology to enrich students' learning (KPM, 2013).

The integration of technology in the classroom has become a trend nowadays. The use of technological resources such as mobile devices , digital cameras, social media networks, software applications, the Internet and others types of devices in classroom became more popular. Thus, the technology nowadays, accessible and ready to use, and supports curriculum goals as well as helping students achieve their learning objectives . Effective

technology integration able to be achieved when students are able to choose technology tools to help them search for information, analyze and synthesize information, and present it professionally (ISTE, 2016).

Drone technology is seen as something new to be introduced in the classroom. The integration of drones in education is able to increase students' interest in STEM as well as in innovation. Various benefits can be obtained through the integration of drones in learning, including exposure of the latest technology to students, improving students' thinking skills, hands-on activities and others.

Research Background

Dron Technology

Innovation is a new idea, concept, strategy and enhance a practice (Ronger, 1971; Spencer, 1994; Educational Technology Glossary, 1995). The rapid development of technology has required innovation in learning including the integration of drone technology in teaching and facilitation.Generally, drones known as unmanned aerial vehicles controlled by the control device from a certain distance. The special name of the drone is Unmanned Aerial Vehicle (UAV). Due to its driverless features, drones began in the military, function in conducted surveys and spies in an area. After going through several evolutions, drones have been widely used in various fields. Nowadays, people can afford to buy the drone in reasonable price.

Drones divided into two dimension which are specifically for military and for commercial use.Drones for the military are drones that can only be used by the military or the government, while commercial drones are usually sold in stores widely and can be used by all members of the general public. These two types of drones are not only different in terms of how they are used, but also different in terms of their function. The drones are available in different types and sizes that possess unique characteristics and capabilities which enable use in all levels of education from primary to high school level. Bai, O., Chu, H., Liu, H., & Hui, G. (2021). There are various types of drones on the market. It varies according to the size of the drone, distance and duration, and features . Drone shortest flight distance a is about 5 km with a flight time of no more than 1 hour. While the longest flight distance is 650 km and can fly for more than 12 hours. The ability of a drone to stay in the air space depends on the number of rotor

installed. The number of rotors gives a different name for each drone . Quadcopter, Hexacopter and Octocopter are the types of drones according to the number of rotor available on the drone .

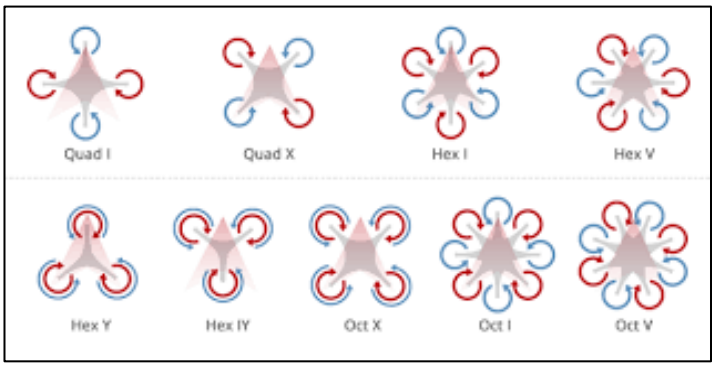

Figure 1 shows the types of drones according to the number of rotors.

Drone Integration in Teaching and Learning Strategies

The integration of drone technology in teaching and learning sessions is something new. Not many studies had been done to prove the effectiveness of its implementation. However, the practice of drone detection in the classroom has been widely implemented by the teachers. For example in Spain, learning technology, programming and robotics were part of the country's official curriculum in 2015. The five dominant pathways for starting a successful drone education emerging from the interview data were as follows: timed racing trials; precision flight obstacle courses; computercoding; videography; and domain- specific knowledge of drone operation laws and ethics. Slater, T. F. (2024). Pupils taught about simple programming and robotics. Learning becomes more interesting and appealing to students to technology and robotics (Lopez , 2016)In the United States, coding (programming) learning has become very important in almost schools. They think that programming skills as important as literacy. The use of programmable robots with simple programming, makes learning more fun and exciting. A joinventure of Software Company Tynker and drone manufacturer known as Parrot provided over 60,000 schools and student age of 7 years are starting to learn a programming language based on block through Tynker. Most schools use drones to teach robotics until the new version of drone named Mambo Mini Dron was created as a result of the collaboration between the two companies. With the price as low as $ 150, students are able to program the drone to make interesting movements under their own control. This has brought coding and programming learning in new dimension in USA

Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) is a model of acceptance of information technology that improvise from Technology Reasoned Action (TRA) by Davis in 1989. Through TAM, two main constructs have been added to the TRA namely Perceived Usefulness and Perceived Ease of Use. Both of these perceptions affect Behavioral Intention. Usability affects usability.

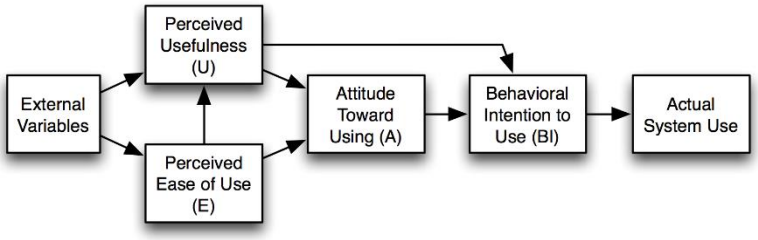

Figure 2 Technology

Acceptance Model (TAM)

Perceived Usefulness in education refers to the extent teachers believe that the use of a technology will help improve the quality of teaching and learning. If a teacher believes that a technology is useful, then he will use it. This construct greatly influence the attitudes, intentions and behaviors of users towards the use of a technology compared to other constructs. This construct is strongly influenced by the ease constructs (Perceived Ease of Use) whenever the person finds something that is easy to use technology, then he would use them without hesitation.

Research objective

This study was conducted based on the following research objectives:

i. To Identify the Level of teacher Acceptance of Drone Integration in teaching and Learning Strategies.
ii. To Examine the teacher Perception towards Integration of Drone in Teaching and Learning Strategies.
iii. To Examine teachers Trend toward Intergration of Drone in Teaching and Learning Strategies.

Research questions

i. What is the level of teacher's acceptance of drone integration in teaching and learning strategies?
ii. What is teacher's perception towards integration of drone in teaching and learning strategies?
iii. What is teacher's trend toward intergration of drone in teaching and learning strategies?

Research methodology

This study is a pilot study with quantitative methods of review, which aims to review the teachers' acceptance, perception and the trend of drone intergration in teaching and learning strategies.

The sample was randomly selected, and the questionnaire distributed using the Google Form. There were 110 respondents involved consists of primary and secondary school teachers. The questionnaire divided into four section whereby the likert scale have been apply in section B ,C and D with 5 Likert scales namely (1) Strongly Disagree, (2) Disagree, (3) Uncertain, (4) Agree, and (5) Strongly Agree.

Reability Indeks

Table 1
Reability Indeks

Construct	Cronbach's Alpha
Teachers acceptance	0.917
Teachers perception	0.890
Teachers trend	0.881

Research Findings
Respondent Demografic

Table 2
Respondent Demografic

Items	Frequensi	Percentage	Cumulative Percentage
Gender			
Male	43	39.1	39.1
Famale	67	60.9	100.0
Total	110		
School			
Primary	54	49.1	49.1
Secondary	56	50.9	100.0
Total	110		
Teaching Experince			
0 - 10 years	25	22.7	22.7
11 - 20 years	51	46.4	69.1
21 - 30 years	25	22.7	91.8
More than 30 years	9	8.2	100.0
Total	110		

Based on Table 2, the respondents consisted of 43 (39.1%) male teachers and 67 (60.9%) female teachers. Meanwhile, the breakdown by school type shown that 54 (49.1%) primary school teachers and 56 (50.9%) secondary school teachers. For the teaching experience category, a total of 25 (22.7%) teachers with teaching experience under 10 years, 51 (46.4%) teachers experienced between 11 to 20 years, a total of 25 (22.7%) teachers experienced between 21 to 30 years, and a total of 9 (8.2%) teachers with teaching experience over than 30 years.

What is the Level of Teacher's Acceptance of Drone Integration in Teaching and Learning Strategies?

Table 3
Level of Teacher's Acceptance of Drone Integration in Teaching and Learning Strategies

Item	1	2	3	4	5	Min	S.P.
Drone technology is really needed in daily life	6	14	37	39	14	3.373	1.039
Drone technology involved problem solving skills	2	10	31	50	17	3.636	0.916
Drone technology help to improve career achievement	5	9	35	38	23	3.591	1.052
Total						3.533	1.002

Table 3 shown that means for teacher accepatance is moderate with means value of 3.533. This proves that teachers can accept and integrate drones in teaching and learning. Findings from this table also shown that respondents agree that drone technology involves problem-solving skills.

What is Teacher's Perception towards Integration of Drone in Teaching and Learning Strategies?

Table 4
Teacher's Perception Towards Integration of Drone in Teaching and Learning Strategies

Item	1	2	3	4	5	Mean	S.P.
Intergration of Drone Technology compenent in curriculum does not interfere teaching and learning process	7	9	36	42	16	3.463	1.046
Intergration of Drone technology component will not add to my workload	11	16	35	36	12	3.20	1.132
The integration of drone technology in the curriculum does not affect the preparation time during teaching and learning session	12	17	33	37	11	3.164	1.146
Total						3.275	1.108

Based on Table 4, Teachers' perceptions of drone integration in teaching and learning are moderate with an overall mean value of 3.275. Teacher's perception on Intergration of Drone Technology
Compenent in curriculum does not interfere teaching and learning process is the highest mean (mean 3.463; SP 1,046), the lowest (mean 3,164; sp 1,146) which the item of the integration of drone technology in the curriculum does not affect the preparation time during teaching and learning session

What is Teacher's Trend toward Intergration of Drone in Teaching and Learning Strategies?

Table 5
Teacher's Trend Toward Intergration of Drone in Teaching and Learning Strategies

Item	1	2	3	4	5	Mean	S.P.
I am interested to learn about drone technology	2	3	17	38	50	4.191	0.924
I plan to use drone technology in teaching and learning strategies	6	14	28	32	30	3.600	1.175
I agree if drone technology implemented in teaching the new syllabus.	11	12	32	34	21	3.382	1.204
Total						3.724	1.101

The findings from Table 5 shown that the majority of teachers tend to integrate drones in teaching and learning session with an overall mean of 3.72. Teachers interested in learning about technology drone is the highest score with a mean value (min 4:19; sp 0.92), while the lowest score is about intergrate the drone technology in new syllabus with mean values 3.382; SP 1204).

Discussion

Based on the findings of this study, it can be concluded that teachers have a high level of acceptance on using a drone technology eventhough this technology is new and teachers less exposure on it, but generally respondent in this study have a general knowledge about it. Meanwhile, 56.3% (62 of 110) of teachers in this study agree that integration of drone in the curriculum will give impact on teaching and learning preparation.

However, the level of teachers tendency to integrate drones in teaching and learning is slightly higher than the level of teachers' acceptance and perception . This is indicated by the overall mean value (mean 3,724). The findings also show that 80% (88 out of 110) teachers are interested in learning about drone technology . This gives a positive picture of drone integration in curriculum . This is also supported by the findings showing that 56.3% (62 out of 110) teachers plan to use drone in teaching and learning strategies.

Conclusion

Overall, teachers are ready to integrate drones in teaching and learning. However, due to the lack of exposure to drone technology , this technology is considered foreign to them. The integration of drone technology in PdPc is the latest technology in exposing students to science and technology, innovation and computational skills. Therefore, teachers need to be prepared with the latest technological skills such as drones to improve the quality of PdPc Therefore, several suggestions need to be taken to implement drone integration in teaching and learning in classroom . Courses must be conducted to trend teacher's skills and increase their confident level. In addition, the Ministry of Education also needs to equip each school with a drone unit to facilitate teachers to implement drone integration in teaching and learning.

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